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Commercial Editor: P. E. CARDEN.

Advertising Manager: F. BARRINGTON HOOPER, B.A.

Production Manager: R. J. LOVELL

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Telephone: Trafalgar 6171 (*Private Branch Exchange*)
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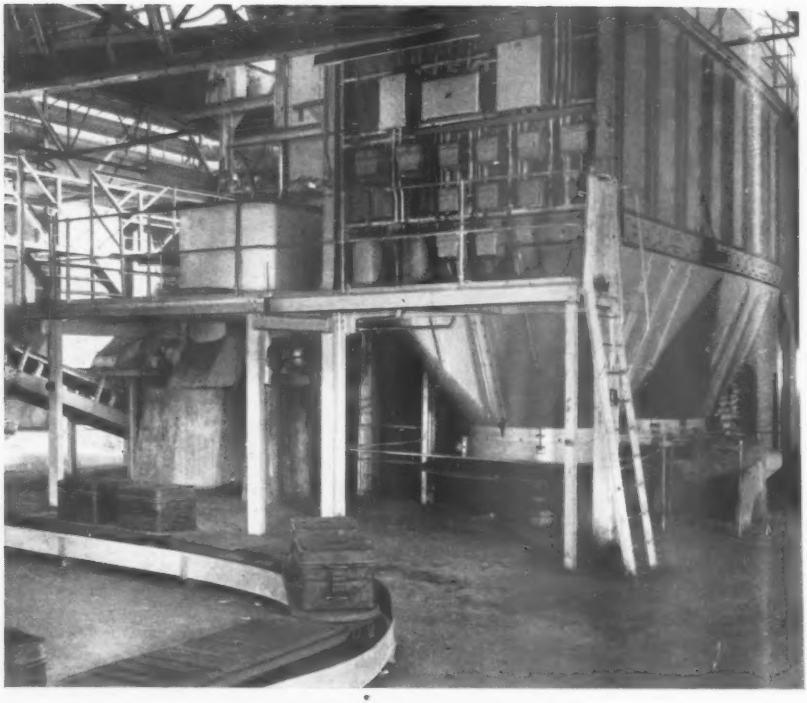

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FOUNDRY EFFICIENCY

Sand Preparation Plant by

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Two large storage hoppers with rotary table feeders, supplying reconditioned sand to belt conveyor ; to bucket loader (with bifurcated chute) which charges two 2F size August-Simpson Mix-Mullers. Batch capacity of each Mix-Muller is 2,000 lbs. Note the August Mould Conveyor in foreground.

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FOUNDRY
TRADE JOURNAL

Vol. 105 OCTOBER 9, 1958 No. 2191

The Foundry Industry of Ulster

Ulster is British. This is announced by a large placard to all arrivals at Belfast, but, in truth, there is no need to stress the fact, as one sees everywhere branch establishments of the multiple shops familiar to visitors to Manchester, Birmingham and Leeds. In the foundries, Union Jacks vie with pin-up girls as popular bench decoration. There are, however, slight but important variations in the laws of the land which differ from those of the United Kingdom. First, there is no conscription for the armed forces, then British subjects as well as foreigners need a work permit before they can accept employment, and finally, there is usually a time lag before the laws made in the House of Commons are endorsed by the North of Ireland Government. The existence of conscription in the United Kingdom tends to prevent young men from leaving Ulster and, if they marry young, family ties do not encourage emigration. Underemployment is the reason for the imposition of the work permit—there are about 30,000 unemployed in the Northern counties. The lag in the implementation of Acts of Parliament is shown in the foundries by the fact that provision of bathing facilities is only just receiving attention.

The Northern counties in recent years have been making something of the order of 26,000 tons of iron castings a year, of which half-a-dozen foundries will account for 90 per cent. We know of no statistics which will reveal the output of the non-ferrous castings, but it can be presumed that it will follow much the same proportions as on this side of the Irish Sea, for very large manganese-bronze propellers are being made in appreciable quantities. There is no steel foundry in existence, but just over the border, at Dundalk, a new concern has taken over some railway shops and has purchased electric furnaces in order to enter this line of business.

Ireland is handicapped insomuch as all fuel, pig-iron and the like has to be imported. The Government, however, does allow a rebate on the prices charged to industry for electricity and fuel and in other ways encourages the establishment of new concerns. A second drawback is that for foreign exports, transhipment at Glasgow or Liverpool increases costs. It is thus obvious that efficiency in manufacturing is a prerequisite for the firms established or to be started up in Ulster. Great progress has been, and is being, made. Since the war, the population of Belfast has grown and is now approaching half a million—thus, in itself, constituting an important market. One English firm recently established is satisfied that the local labour is alike good and adaptable. A new large factory which has been in full production for a year or so is in the Associated Electrical Industries Group. This should make an important contribution to the economy of the country.

Steel Plant for Argentina

Plant worth £500,000 is to be supplied by the Incandescent Heat Company, Limited, Smethwick, to the Sociedad Mixta Siderurgia Argentina (SOMISA). An order has been received for 25 single-stack coil annealing furnaces with 72 bases, 32 forced cooling hoods, and three exothermic gas-atmosphere plants each rated at 10,000 cub. ft. per hr.

The furnaces are built under licence to the design of the Lee Wilson Engineering Company, of Cleveland, US. The plant will handle coils up to 60-in. dia. in stacks up to 168-in. high, and will anneal annually 300,000 tons of cold-reduced sheet and tinplate. The equipment will be manufactured and completely assembled at the Smethwick works of the Incandescent Heat Company, Limited. The order will be completed within 12 months.

Sociedad Mixta Siderurgia Argentina is a semi-State enterprise which, under the national steel plan, is building a large integrated steelworks at San Nicolas, near Rosario. The works is scheduled for completion by 1959, but small-scale operation will begin this year.

Forty Years Ago

It is now possible to see foreshadowed the approaching end of the first world war in the October 1918 issue of the FOUNDRY TRADE JOURNAL—there was raised the question of finding jobs for the munition workers and a resuscitation in the registration of new companies. The list published of new ventures included the names of the Star Foundry Company, Limited; Bowling & Company, Limited; Thomas Willett & Company, Limited; John Burn & Company (Birmingham), Limited; and J. & H. McLaren, Limited.

STAVELEY IRON & CHEMICAL COMPANY, LIMITED—Mr. E. Freer, foundries general manager, has been appointed to the board.

Warning on Indian Steel Expansion

Warning that over-emphasis on steel production in India's future plans would prove a costly mistake is given by Mr. J. R. D. Tata, chairman of the Tata Iron & Steel Company, Limited, Bombay, in his annual statement. He particularly warns the country against allowing the steel industry to run away with too great a proportion of whatever total resources would be available in future plan periods. Mr. Tata advocates instead a greater concentration on secondary and finishing industries using steel. More trucks, cars, machine tools, and capital and consumer goods of all sorts should be made in preference to raw steel.

Though the setback in the company's profits was to be deplored, the chairman states that there is no cause for alarm. The new plant which is due to go into operation towards the end of the current financial year should retrieve the situation.

Imports of Unwrought Aluminium from the USSR

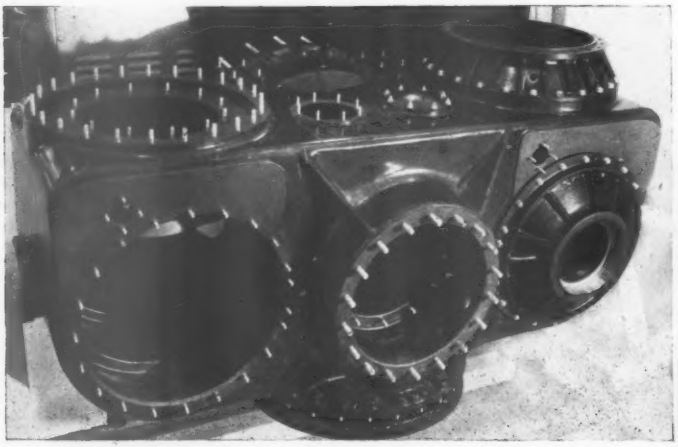
The Soviet authorities have informed the Board of Trade that Wraznoinbort—the foreign trade organization which alone is empowered to sell Soviet aluminium—will not export more than 15,000 tons of unwrought aluminium to the UK in the next 12 months.

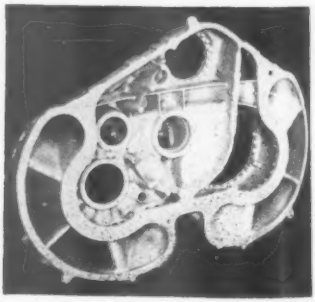
At the same time the Board of Trade announced that it has decided to take no further action on the application of the Aluminium Company of Canada, Limited, for an anti-dumping duty under the Customs Duties (Dumping and Subsidies) Act, 1957.

NEW ORDERS from Canada, Switzerland, and Spain for three ingot-casting machines worth about £40,000 have been won by Sheppard & Sons, Limited, Bridgend (Glam).

Castings Displayed at Farnborough

Illustrated below are two outstanding castings from the very comprehensive displays at the Farnborough Air Show this year. They are (left), a gear-box housing for the Westland helicopter, sand-cast in Magnesium-Zirconium alloy DTD. 748, by J. Stone & Company (Charlton), Limited, and (right), an Armstrong Siddeley air duct made by Sterling Metals Limited, using the gravity-die-cast process, in Magnesium-Zirconium alloy RZ5. These castings indicate the very high standards being achieved.





Aluminium/Silicon* Alloy Its Solidification and Structure

By S. Ghosh, B.E. (Met. Eng.) and V. Kondic, B.Sc., Ph.D.†

This paper is an account of the authors' own researches at Birmingham University, in addition to extracts from earlier work on "Silumin" metallurgy. Currently-held views are commented upon (sometimes in a provocative manner) in relation to the new work, and both theory and practical foundry significance are integrated.

It is one of the unusual features of metallurgy that the alloys that are industrially amongst the most important ones are also metallurgically most interesting. This is certainly true of eutectic Al/Si alloy or Silumin. From the early discovery (by Pacz[1], in 1920) of the means of improving the structure and properties of this metal by means of modification, this alloy has been used in the foundry industry on an ever-increasing scale. At the same time, metallurgists have studied many unusual phenomena associated with the origin of the as-cast structure of Silumin, but without, as yet, obtaining a complete answer to all the various problems encountered. It is the objective of the present paper to examine the currently-held views and theories of solidification of Silumin, and then re-examine some of these theories to explain the results obtained by the Authors. As many of the problems which are discussed have also a distinctly practical foundry significance, the question of correlation of theory and practice is also borne in mind.

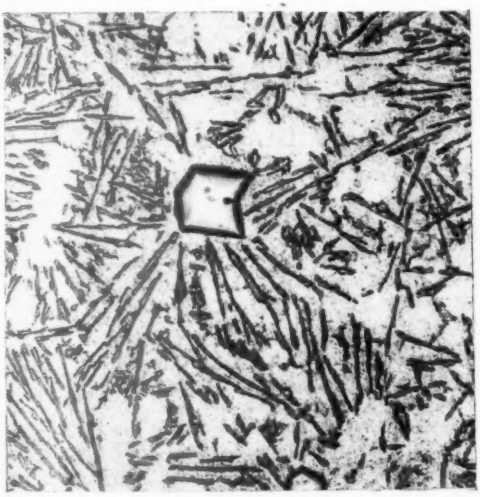


FIG. 1.—*Unmodified Silumin* (×190).

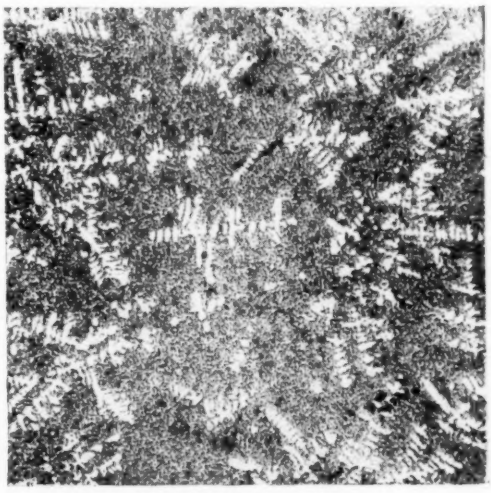


FIG. 2.—*Modified Silumin* (×190).

PREVIOUS EVIDENCE AND THEORIES

Amongst the many experimental observations concerning the structures of Silumin, perhaps the two outstanding ones were made quite early in the development of this alloy. Otani[2] and Gwyer and Phillips[3] noted that the structure of this alloy is very sensitive to the rate of cooling, namely, that the silicon phase of the eutectic is relatively coarse with the slowly cooled alloys, Fig. 1, and becomes progressively finer with the faster cooling rates, Fig. 2. The other experimental observation is that due to Pacz[1], who noted that the silicon crystals could be made fine even in slowly cooled castings if a small amount of sodium were added to the alloy. Numerous further experimental observations have been made since, for example: a Na-

* For the sake of general understanding, the Authors' title "Silumin" has been changed to Aluminium/Silicon Alloy, *i.e.*, previously known in this country as L33, and nowadays B.S.S. LM6 alloy.

† The Authors are, respectively, research investigator, and lecturer, at the University of Birmingham.

Aluminium/Silicon Alloy

treated alloy solidifies at a slightly lower temperature than an untreated alloy; the eutectic in the fine or modified alloys contains more Si than in the coarse or unmodified state, and small amounts of P in the alloy appear to produce an effect opposite to that of Na, namely, to coarsen rather than refine the state of Si. Foundry practice added more observations which are equally relevant for a full understanding of this alloy, for example, that Na could be added by means of a salt or as metallic sodium, but in either case in order to produce a fully modified structure, the amount of Na added is critical, otherwise the alloy will be under or over-modified. Furthermore, the modified alloys have comparatively lower fluidity and are more prone to both shrinkage and gas porosity.

Two Views

Many theories that have been proposed to account for this diverse behaviour of Silumin could be classified into two main groups, respectively, those based on nucleation; and on crystal-growth behaviour. Gürtler,[4] Patterson[5] and many others who subscribe to the nucleation theory, explain that Si Crystals form more readily if suitable nuclei are available. For example the Al/P constituent, which occurs when phosphorus is added, will tend to make the structure coarse. Sodium, on the other hand, it is argued, removes or "poisons" such nuclei, the alloy supercools and eventually a shower of fine Si crystals forms in the metal during its undercooled state, resulting in a fine or "modified" structure. The second group of theories of Chalmers[6], Gwyer and Phillips[2] and others, rest on the assumption that Na or P or rate of cooling and other variables control the process of growth of Si crystals from the liquid alloy. Whenever this growth of Si crystals is made more difficult through the change of surface-energy or rate of diffusion or "state" of Si-atoms in the melt, then the eutectic structures becomes fine.

Two Routes

It appears from this very abridged summary of the general metallurgy of Silumin that two main routes are open for further experimental studies—first, thermal studies, in order to obtain a clearer picture of thermal behaviour of Silumin during solidification in relation to various compositions and rates of cooling and, secondly, a metallographic study of various crystals occurring in Silumin at different stages, as well as states of their formation, in order to understand the general transition from liquid to the solid state from the point of view of nucleation and crystal-growth phenomena. In the present paper, an account of some thermal studies recently carried out by the Authors will be given, and the results compared with those previously reported by various investigators.

The experiments were planned along the following lines. It has been previously shown that Silumin can solidify at various temperatures, but no systematic work has been published relating different solidification temperatures to the corresponding microstructures obtained and, particularly, no evidence is available to show whether Silumin modified by means of rapid quenching, and that obtained by Na-additions, are basically identical structures, or whether they solidify through a different mechanism. The following series of experiments was therefore carried out: (*a*) a eutectic Silumin was solidified at three different cooling rates and the cooling curves and resultant microstructures recorded (*b*) these experiments were then repeated with the same alloy, but treated with either Na or P respectively; (*c*) a few selected alloys were quenched during the process of freezing in order to study the growth of the eutectic structure from the liquid state.

EXPERIMENTAL DETAILS AND RESULTS

(*a*) *Alloy Composition*

All the work described was carried out on Silumin obtained by alloying super-purity Al (99.999 per cent. purity) and Al/50 per cent. Si temper alloy, the resultant composition showing the following analyses: Si 11.78, Fe 0.051, Cu 0.006, Na 0.0005 and Ca 0.008 per cent. This alloy, when frozen very slowly, gives a structure in which both primary dendrites of α-aluminium-rich solid-solution, and crystals of primary silicon are absent, and which therefore corresponds to the normally accepted definition of a eutectic. When this alloy is cooled relatively fast, both α-dendrites and primary silicon may appear in the microstructure. A tentative explanation of this phenomenon will be discussed later. Sodium was added to the alloy by means of 3 per cent. by weight of a modifying flux (two parts NaF and one part NaCl) at 800 deg. C., and cooled over 5 min. to the experimental temperatures required. Phosphorus was added by means of 0.02 per cent. by weight of red-phosphorus at 750 deg. C. and cooled over 3 min. to the required temperature.

(*b*) *Rates of Cooling*

Hollow spherical silica crucibles, 0.75 in. dia., containing the molten alloy were cooled at three different cooling rates, *viz.*, very slowly in the furnace, at medium rate in a solder bath which was maintained at 474 deg. C. and very rapidly by quenching in iced brine.

(*c*) *Temperature Measurement*

The temperatures were measured by means of 28 s.w.g. chromel/alumel thermocouple with the hot-junction either coated with Al_2O_3 or sheathed by a very-thin-walled silica tube. The temperatures were read on a Negretti-Zambra potentiometer or recorded on a Tinsley high-speed recorder. The accuracy obtained was ± 1 deg. C.

The principal results are summarized in Table 1. The curves show the following main features: At very slow rates of cooling, all three alloys, *i.e.*, the binary Silumin and that also containing either Na or P respectively, solidify at the same temperature, which is the equilibrium solidification temperature

TABLE 1.—*Summary of the principal results obtained in the series of experiments with Silumin.*

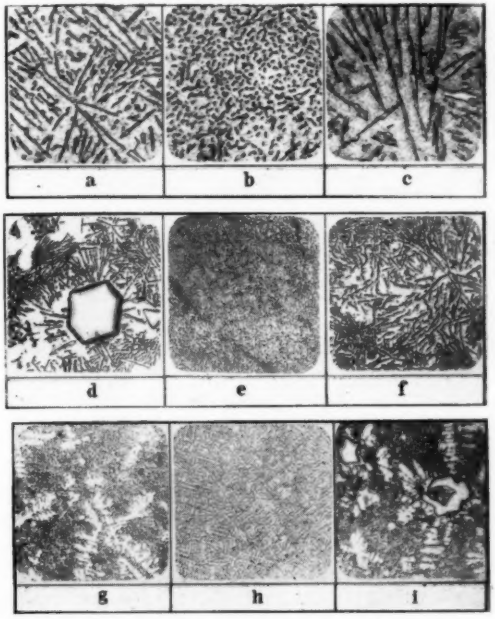
RATE OF COOLING	VERY SLOWLY	COOLED IN FURNACE FROM 700°C		MEDIUM-COOLED IN SOLDER-BATH AT 474°C FROM 700°C			VERY FAST-QUENCHED IN ICED-BRINE FROM 700°C		
ALLOY-COMPOSN.	EUTC. Al-Si	EUTC. Al-Si +Na	EUTC. Al-Si + P	EUTC. Al-Si	EUTC. Al-Si +Na	EUTC. Al-Si + P	EUTC. Al-Si	EUTC. Al-Si +Na	EUTC. Al-Si + P
COOLING-CURVE (SCHEMATIC)	a	b c d	c	d	e	f			
UNDERCOOLING: INITIAL	ABSENT	ABSENT	ABSENT	PRESENT	PRESENT	PRESENT	DIFFICULT TO OBSERVE	DIFFICULT TO OBSERVE	DIFFICULT TO OBSERVE
UNDERCOOLING: EUTECTIC	ABSENT	ABSENT	ABSENT	PRESENT	PRESENT	PRESENT	DIFFICULT TO OBSERVE	DIFFICULT TO OBSERVE	DIFFICULT TO OBSERVE
MICRO-STRUCTURE: PRIMARY SILICON	GENERALLY ABSENT - EXCEPTING A FEW CRYSTALS AROUND THE WALL OF THE CONTAINER.	COMPLETELY ABSENT	GENERALLY ABSENT - A FEW CRYSTALS FOUND IN CERTAIN AREAS OF NO PARTICULAR POSITION.	FEW LARGE CRYSTALS AROUND WHICH THE EUTECTIC HAS GROWN	ABSENT COMPLETELY	GENERALLY ABSENT - A FEW CRYSTALS FOUND IN CERTAIN AREAS OF NO PARTICULAR POSITION.	COMPLETELY ABSENT	COMPLETELY ABSENT	PARTIALLY MICROMETE & SMALL CRYSTALS ALL OVER THE MATRIX.
MICRO-STRUCTURE: PRIMARY-α	COMPLETELY ABSENT	COMPLETELY ABSENT	COMPLETELY ABSENT	FEW DENDRITES AROUND THE PRIMARY SILICON CRYSTALS	FEW DENDRITES AROUND THE CONTAINER-WALL	COMPLETELY ABSENT	ABUNDANCE OF THIN, SMALL DENDRITES ALL AROUND	VERY FINE DENDRITES IN UNRESOLVABLE MA TRIX OF EUTECTIC	MASSIVE DENDRITES AROUND PRIMARY-Si & ALSO ELSEWHERE
MICRO-STRUCTURE: EUTECTIC	VERY COARSE AND FAIRLY WIDELY SEPARATED, LAMELLAR	LARGE PSEUDO-GLOBULAR, FINER INSIDE THE EUTECTIC-GRAINS	EXTREMELY COARSE, WIDELY SEPARATED, ELONGATED LAMELLAR	LAMELLAR, BUT MUCH FINER-GROWN AROUND THE PRIMARY-CRYSTALS	VERY FINE, GLOBULAR, PARTIALLY UNRESOLVABLE	MEDIUM-COARSE LAMELLAR.	FINE PSEUDO-GLOBULAR PARTIALLY UNRESOLVABLE.	EXTREMELY FINE, UNRESOLVABLE, APPARENTLY GLOBULAR	MIXED LAMELLAR AND PSEUDO-GLOBULAR IN BETWEEN THE PRIMARIES
MICROGRAPH PHOTO-(×80) (SEE BELOW)	a	b	c	d	e	f	g	h	i

for this alloy. This finding is contrary to some views previously held that Na leads to a lower solidification temperature, irrespective of the cooling rate used. When a faster cooling rate is used, then two undercooling phenomena become apparent: the beginning of solidification is shown, with a relatively large initial undercooling, subsequently the temperature increases and remains stationary during solidification but at a lower value than the equilibrium temperature. This initial undercooling-trough occurs with all the three alloys but its magnitude is not highly reproducible, on the other hand the horizontal or solidification undercooling is readily reproducible and is characteristic for each alloy, the Na-modified alloy showing the greatest degree of solidification undercooling. With the very fastest cooling rates used, the time of solidification was so short that no accurate solidification temperature measurements could be taken with any of the alloys.

Microstructures

Microstructures obtained from melts of the various compositions and different cooling rates show the following main features. Primary silicon or primary α-dendrites are absent with very slow cooling rates. When the cooling rate increases, then the primary α-dendrites appear in the microstructure, increasing in quantity with an increasing rate of cooling. At the same time, primary Si-crystals appear in the microstructure, but their appearance is a far less regular feature than that of the presence of primary α-dendrites. All these changes with increasing cooling rate take place in all the three alloys used, except that primary Si is always absent in Na-treated alloy.

However, by far the most important observation concerning the microstructure is that concerning the eutectic itself. In the simple binary Silumin, the eutectic is very coarse with the slow cooling-rates, the silicon phase appearing as long needle-like crystals. These crystals, at any cooling rate, are even coarser when the alloy is treated with P, whilst on the other hand in the Na-containing alloy, the Si-crystals are far smaller, stubby units. With



an increasing cooling rate, silicon crystals become finer in all alloys, so that at high cooling-rates all the three alloys become fine or "modified" but the Na-treated alloy has finest and most-uniformly-distributed Si-crystals at any given comparative cooling rate.

The corresponding structures of the three alloys at different cooling rates are shown in Figs. 3 to 11 respectively. The progress of formation of the cast structure of an untreated alloy cooled in air during the solidification can be seen in Figs. 12 to 15. The structures shown were obtained by quenching samples at various stages during the freezing process. At the very beginning of freezing, Fig. 12, *i.e.*, the lowest point in the trough of the initial undercooling temperature, the eutectic has just

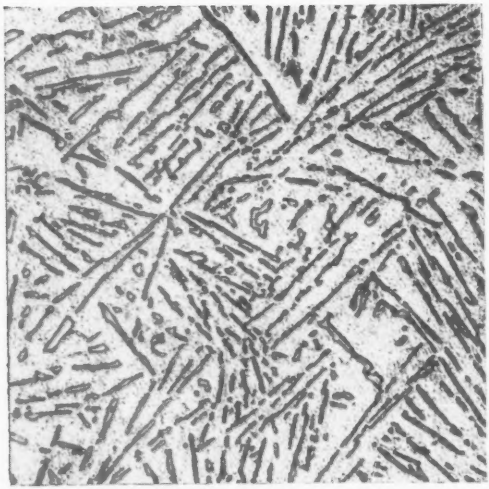


FIG. 3.—*Untreated Silumin, slow-cooled* (× 190).

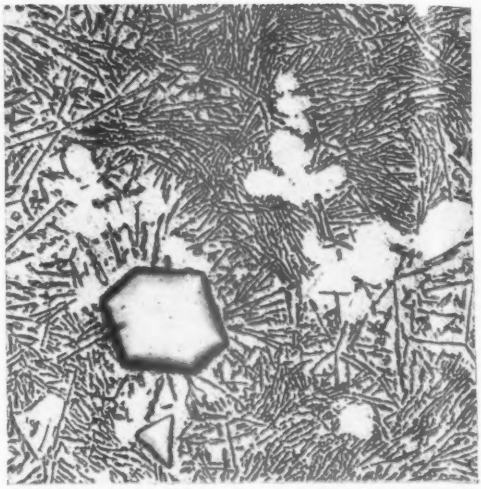


FIG. 4.—*Untreated Silumin, medium-cooled* (× 190).

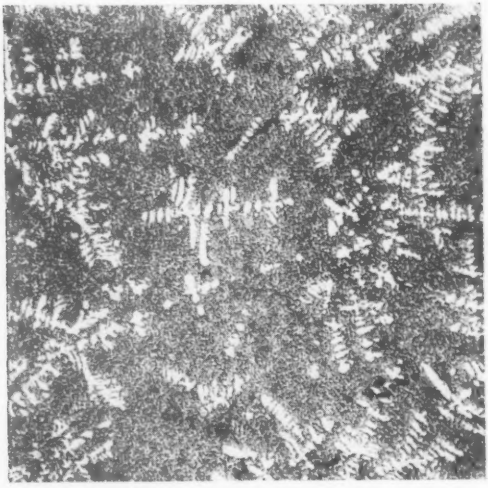


FIG. 5.—*Untreated Silumin, fast-cooled* (× 190).

started to grow around the primary Si-crystals. The liquid present at that time has formed fine modified structures on quenching. The eutectic has grown considerably more at the stage, shown in Fig. 13, when the alloy is quenched at the beginning of the solidification-undercooling temperature. Towards the end stage of freezing, Fig. 14, and almost at the very end, Fig. 15, the small pockets of liquid that were still left at the time of quenching can be clearly discerned from the already-solidified part of the sample. The microstructures shown in Figs. 12 to 15 are helpful in understanding the mechanism of solidification of Silumin.

COMMENT ON THE RESULTS

The results described will be considered from two different viewpoints: first, an attempt will be made to build a general picture of freezing of Silumin and particularly with respect to the phenomenon of solidification. Secondly, the general picture obtained will be contrasted with currently-held views in the same field. Finally, some conclusions will be drawn with respect to the current foundry practices of modification of Silumin.

Perhaps the most striking observation obtained in the present work is that it shows that a particular microstructure of Silumin corresponds first to a particular temperature of freezing and secondly to a given Na or P content, which in their turn lead to different grades or types of Si-crystals. In other words, with a constant alloy-composition, each different microstructure is obtained at a given solidification temperature. The relative importance of Na or P can be seen best when the alloy is very slowly cooled and all structures are compared at the same solidification temperature, Table 1. With faster cooling rates, the effect of Na is two-fold: Si-crystals are made finer or modified through the intrinsic effect of Na alone, but also through the fact that the temperature of solidification is lowered too, which fact alone leads to Si-crystal refinement. The same is true of the effect of P, which, however, leads to coarsening rather than refining of Si-crystals.

A General Phenomenon

The second observation follows from the first, namely that all the variants of the structure of Silumin can be obtained with a single alloy. For example a simple binary Al/Si alloy can give all the structures that can be obtained with Na-treated alloy, but different cooling rates have to be used. This means that a simple binary alloy can be made

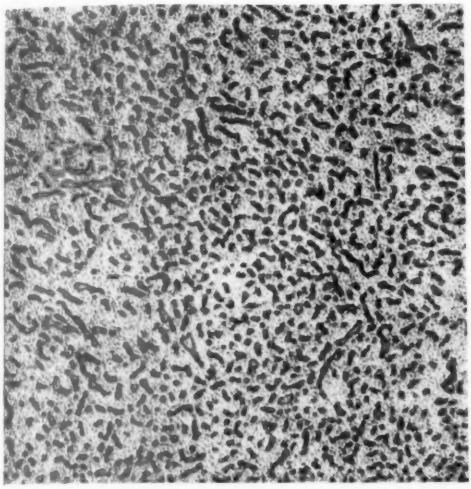


FIG. 6.—*Na-treated Silumin, slow-cooled* (× 190).

FIG. 7.—*Na-treated Silumin, medium-cooled* (× 190).

as fine—or modified— as the Na-treated alloy, provided a fast-enough cooling-rate is used. This shows that " modification " is no peculiar feature of Na addition, but largely the consequence of the solidification temperature for a given alloy. In consequence, it appears that the term " modification " of Silumin which has been attributed to Na addition is an unnecessary and misleading term as it implies a peculiar effect due to Na alone and characteristic of Silumin. It is suggested that the Si grain-refinement described in the present paper is just one example of crystal refinement which is not peculiar to Silumin, but a general metallurgical phenomenon. Si-crystals are in no way " modified " but just made finer in size, a result which can be obtained by either varying the cooling rate alone or the alloy composition. The question whether Si-crystals differ in some other manner apart from that of size alone is being further investigated.

The general picture of solidification of Silumin which can be drawn from these results described is essentially one obtained in terms of thermal phenomena. Prior to the beginning of freezing, all Si is dissolved in molten Al, and as yet little can be said about the more detailed nature of the state of distribution or mixing of silicon and aluminium atoms. When the alloy begins to solidify, silicon crystals form as separate units in aluminium, α, matrix. When the alloy is very rapidly cooled, an easy diffusion of silicon atoms is suppressed or in other words, the silicon crystal growth impeded. For example, in the very-rapidly-cooled alloys, silicon crystals are so fine that they could be hardly resolved even at the very high magnification. As the rate of cooling decreases, the growth of Si crystals proceeds further and larger crystals are obtained in the microstructure. This Si-crystal growth is controlled by both the temperature of solidification, which is mainly controlled by the

FIG. 8.—*Na-treated Silumin, fast-cooled* (× 190).

cooling rate, and indirectly by various impurities in the alloy, such as Na and P.

Comparison with Previous Theories

It is difficult on the basis of the results discussed to justify the views that nucleation of Si-phase is the controlling factor of the various microstructures observed with Silumin. First, it is clear that the so-called " modification " effect of Na, is just a particular structure which can be obtained in alloys without Na. Secondly, the effect attributed to P of nucleating the Si-phase leads to coarsening rather than to grain refining, but the idea of increasing

FIG. 9.—*P-treated Silumin, slow-cooled* (×190).

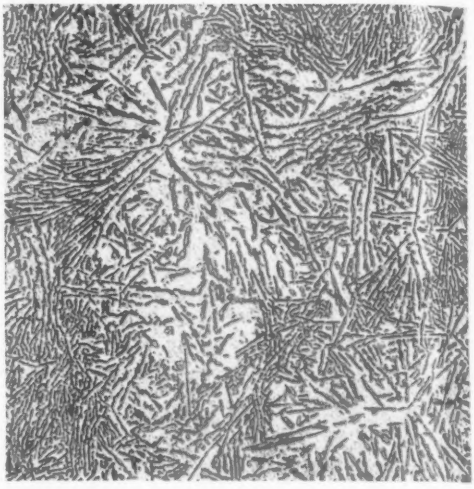


FIG. 10.—*P-treated Silumin, medium-cooled* (×190).

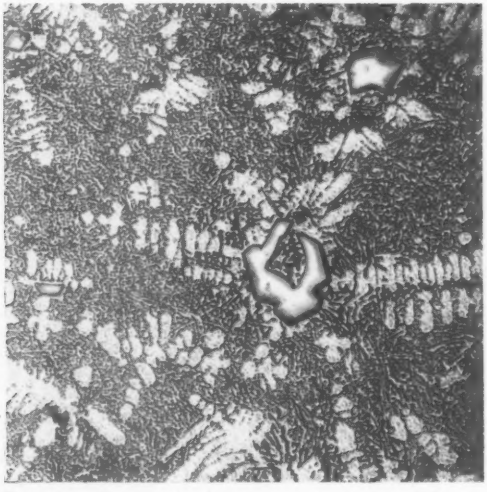


FIG. 11.—*P-treated Silumin, fast-cooled* (×190).

the nucleation by means of suitable heterogeneous nuclei should lead to precisely the opposite effect.

The results reported here are more in agreement with the general hypothesis that it is the grain growth rather than nucleation which is the important factor to account for microstructural changes in Al/Si eutectic alloys. It appears that grain growth is effected by temperature of growth as well as by the alloying effects of Na or P. The former effect is essentially that based on diffusion phenomena, but the latter is not yet easy to ascribe to a particular physical factor. Quite clearly, it could also be argued that at the lower freezing temperature the number of probable nuclei increases, and that this is just as likely to account for Si-grain refinement as the suggested grain growth; but that this is not a likely explanation one can see from some features in the microstructures shown. For example, with the lower freezing temperature obtained at faster cooling rates, both primary α-dendrites and primary Si-phase appear—and yet both are rather coarse than fine in size. To summarize, it is not suggested that nucleation phenomena do not play a part in the formation of cast structures, because, clearly, all crystals must start growing from a centre or nucleus. What is proposed is that the number of potential nuclei is always large, but whether it happens that only some of these grow into a small number of crystals and give coarse structure, or whether many grow and form a large number of crystals and give fine structure, the primarily responsible factor is due to the grain-growth restriction, or freedom, respectively.

Foundry Applications

Three main elements of controlling the structure of Silumin in foundry practice are the rate of cooling, Na addition and the time of holding in the molten state. It is clear from the present work why, for gravity- and pressure-die-casting practice, smaller additions of Na are necessary than in sand foundry practice in order to produce a similar order of Si-grain refinement. In some cases, the rapid rate of cooling alone may be used to obtain the required structure, but if primary α-dendrites or primary Si are to be fully suppressed at relatively rapid cooling-rates, some Na addition appears to be necessary. Here, however, the Si content of the alloy is equally important. In the sand-foundry practice the cooling rate is relatively slow and this accounts for the general application of Na as the grain refining agent of silicon crystals. Here also,

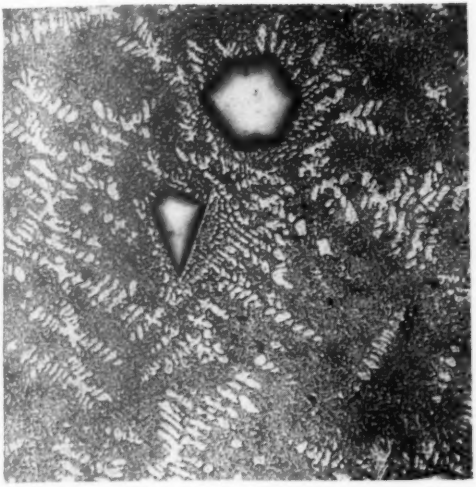


FIG. 12.

FIG. 13.

FIG. 14.

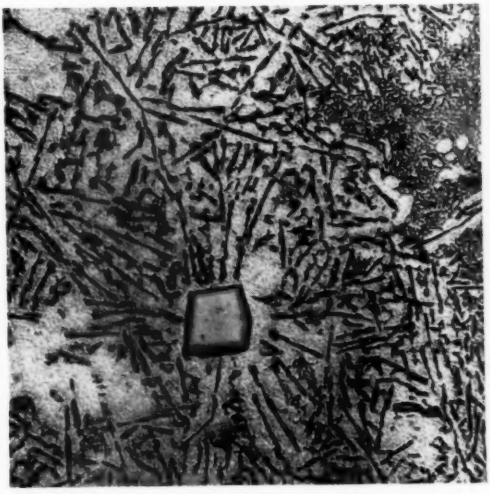


FIG. 15.

FIGS. 12, 13, 14 AND 15.—*Untreated Silumin. Structures obtained after quenching at various stages of solidification* (×190).

the necessary Na content is governed by the cross-section of the casting and a variation of Si-grain size is likely to occur across the casting thickness.

Perhaps the most interesting aspect of grain-refining aluminium/silicon alloys with Na in foundry practice is the effect of the time period between sodium addition and pouring the casting. Whilst it is quite likely that the actual amount of Na retained by the alloy will also vary during this period, it appears also quite feasible that other physical changes may be also taking place in the molten metal. This problem of the distribution of alloying elements in the parent metal in the molten state requires much more experimental work.

Acknowledgments

The Authors wish to express their thanks to Professor E. C. Rollason of the Department of Industrial Metallurgy, Birmingham University, for provision of laboratory facilities for this work.

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News from South Africa

Shaft-driven Worm-reduction Gearbox

A shaft-driven worm-reduction gearbox has been designed by the technical staff of David Brown Precision Equipment (Pty.) Limited, Benoni, Transvaal, at whose works the manufacture has been carried out. The design embodies standard parts as used in the company's existing Radicon gearboxes, with the exception of the casing, which consists of two parts, each part being identical, so that there is only one pattern. The advantages claimed for this unit include: lower maintenance costs, no couplings are required, and it is lighter and smaller than previous models. It is anticipated that there will be a saving of approximately 25 per cent., compared with the conventional design.

New S.-g. Iron Foundry

Clayville Foundry (Pty.) Limited, near Pretoria, has established a section for the production of s.-g. iron castings. The firm proposes to make castings on a jobbing basis as opposed to the other two South African s.-g. iron licensees, who at present manufacture castings on a mass-production basis or make extremely large castings. The main item of equipment is a mechanically charged basic-lined cupola. The refractory material used is supplied by Cullinan Refractories, Limited, Johannesburg, and is tar-dolomite, rammed 9-in. thick direct on to the shell to 4 ft. above the tuyeres. The cupola has an i.d. of 21 in. and produces 1¼ to 1½ tons per hour. The first lining gave 15 heats (approximately 40 to 50 tons of metal) without patching. The normal tapping temperature by optical pyrometer is 1,560 deg. C. The base metal, before inoculation, has a sulphur content of 0.015 per cent., and the tensile strength, after inoculation, as-cast, has reached a maximum of 38 tons per sq. in.

Foundry Industry in East Africa

Mr. F. C. Goldsmith has arrived in South Africa to join Foundry Services (S.A.) (Pty.), Limited, Johannesburg, as representative. *En route* to the Union, Mr. Goldsmith visited East Africa and made a survey of the foundry industry in Kenya, Uganda and Tanganyika, and has given the following interesting facts. Being essentially agricultural, there is little market for general castings in East Africa and furthermore, the territory has no basic raw materials, these being imported either from the United Kingdom or from South Africa. The railways have the largest foundry and are the only users of the shell-moulding process in the territory. They employ about 100 artisans and labourers, the artisans being mainly Africans working under a supervisory staff of Europeans. There is no electric furnace in the whole of East Africa, and as imported coke costs £20 a ton everyone is keen to utilize oil firing. Some idea of the East African output can be gained from the fact that the total quantity of metal melted per month is: Iron, 350 tons, and non-ferrous metals, 240 tons.

Rhodesian Steel

The production of steel at the Rhodesian Iron and Steel Company's works near Que Que, Southern Rhodesia, is increasing steadily, according to Mr. W. C. Fletcher, general manager of Risco. In 1957, he said, production reached 67,000 ingot tons, and in 1958 it was hoped to reach 80,000 tons and possibly 100,000 tons in 1959.

Equipment and Supplies

Crucible-type Furnace

Unit Engineering & Foundry Equipment Company, Egmont Street, Mossley, Manchester, have designed and placed on the market an oil-fired lift-out crucible-type furnace of 100-lb. gunmetal capacity which is illustrated in Fig. 1.

It is claimed that this furnace can melt two pots per hour, during which time it consumes 3 gall. of oil. A drop bottom is fitted to facilitate cleaning and relining. The fan and oil burner are integrated as a single unit, which can be swung away from the furnace when necessary. The furnace is lined with brickwork, carrying an inner 2-in. layer of rammed refractory said to give a life of from 250 to 350 heats. The furnace is available in three sizes, the respective capacities being 60/80; 100/120; and 150/200 lb.

FIG. 1.—*Crucible-type oil-fired furnace, made by Unit Engineering & Foundry Equipment Company, Manchester.*

Miniature Pneumatic Drill

Designed as a miniature rock drill weighing only 7½ lb., a new model (CP9F) now being produced by the Consolidated Pneumatic Tool Company of 232, Dawes Road, London, S.W.6, is a fully self-rotating percussive hand-drill with a wide range of application, and embracing the decoring of castings. Features claimed include a new rotating chuck, a quick-change steel retainer for rotating drill steels or non-rotating chisels, a special valve which ensures maximum drilling speed and powerful rotation with low air consumption, a built-in oiler and a right- or left-hand exhaust, threaded so that a blower hose may be used where necessary. Hollow drills steels enable a jet of air to be directed to the drill point for keeping it cool, removing dust and chipping and preventing "packing."

LORANT & COMPANY, LIMITED, 98 to 100, Croydon Road, London, S.E.20, are now producing a compound table for use on drilling machines for centring multiple-hole drilling, vertical milling and keyway cutting. The table, made in Meehanite and precision ground, measures 12½ by 6½ in., has a 6 by 4 in. movement, is 5½-in. high and weighs 52 lb. It will be shown at the eleventh Engineering Display at the Royal Horticultural Society's New Hall, London, S.W.1, October 21 to 23.

Brockmoor Foundry Developments

Conversion of Cupolas to Hot-blast Working, and the Development of the Shell-moulding Section

An interesting visit was paid by our representative to the works of Brockmoor Foundry Company, Limited, at Brierley Hill, Staffs, a firm which specializes in making blackheart malleable-iron and high-duty grey-iron castings, mainly for general engineering applications. Although malleable founders usually prefer repetition production of quite large quantities, at Brockmoor some quite small runs also are undertaken. The foundry is obviously well-run. It is relatively clean, and orderly, and operations are clearly carried on only on the basis of strictly economical working. Thus, the particular installations which claimed the writer's attention at the foundry can be assessed as being eminently practical. They are (*a*) plant for a conversion to hot-blast working of the two cupola furnaces and (*b*) a shell-moulding section which has made rapid strides and now looks after a quite substantial proportion of the total quantity of castings produced. The account which follows will deal mainly with these two items.

Hot-blast Installation

Since the first description appeared in the JOURNAL on September 16, 1954 (*q.v.*), a number of installations in this country have been made of the horizontal oil-fired blast-heater produced by the Incandescent Heat Company, Limited, and as at the Brockmoor Foundry hot-blast is furnished from this type of plant, the opportunity was welcomed of obtaining first-hand information on its working, and securing user reactions and comments. Essentially the heater consists of a cylinder, 4 ft. dia. by 18 ft. long, housing a high-efficiency, recirculating, tubular heat-exchanger. This incorporates a specially designed combustion-chamber with the objective of ensuring maximium heat release from the fuel through a pressure-type of jet burner. This particular unit is capable of heating 2,000 cub. ft. of air per min. up to 500 deg. C. (Units have now been built to handle up to 3,500 cub. ft. per min. for 8 tons per hour cupolas.) In addition to the heat exchanger, control panel and three hot-blast valves, a new cupola blowing-fan was installed to cater for the extra resistance to the blast in passing through the heater (the existing cupola blowing fan being retained for emergency running on cold blast) and a small combustion-air fan was installed for the oil burner.

At the outset, it should be stated that the management of Brockmoor's are very pleased with the results following installation of the independent heater. They feel that for quite a modest capital outlay they are able to secure results for their quite small production tonnages which are quite comparable with those of much more expensive installations. It should be borne in mind also that, hitherto, hot-blast cupolas of relatively small dimensions have not proved too successful.

Operating Details

The hot-blast installation at the foundry has involved the provision of the independent heater coupled to a pair of ordinary continuous-front-slagging cupolas of 36-in. bore and 48-in. shell dia., which were previously working on cold blast. Over twelve months' experience has now been gained in practical working of the plant. Originally, 44 to 48 charges per day (from 8/8.30 a.m. to 5/5.30 p.m.) were melted for producing cupola blackheart malleable iron, using a charge comprised of 6 cwt. malleable scrap, 5 cwt. steel scrap, 14 lb. ferro-silicon, 7 lb. ferro-managanese and 2 cwt. coke. At present, 50 to 58 charges are melted with the same initial furnace diameter, using hot blast—the charge in this case comprising malleable scrap and steel scrap as before, but only 5 lb. ferro-silicon and 3 lb. ferro-manganese are needed as additions, and coke splits of but 1½ cwt. are used. It will quickly be realized that the daily saving of coke and alloys is quite considerable and Brockmoor estimate that a total of £600 per month is saved with the hot-blast system, even after allowing £120 monthly for the cost of oil fuel for the heater. It was confirmed that capital expenditure on the changeover of the furnaces to hot-blast was covered in less than 10 months' operation.

The tuyeres on the furnace have been left as before, but a new windbelt, independent of the shell, has been fitted to each furnace to permit lagging and to facilitate water cooling. Other changes made do, in fact, include the installation of water-spray cooling of the melting-zone portion of the furnace shell, using mains water for this purpose. The lining is still of cupola firebricks 6 in. thick, but nowadays less burn-back is reported after each melt as compared with that experienced when cold-blast and no cooling was employed. The heater unit employed at Brockmoor, which serves two furnaces alternatively is shown in Fig. 1; Fig. 2 gives an idea of the way in which it is connected to the furnaces (involving only the minimum of floor space), and Fig. 3 shows the instrument panel installed. This panel records blast-volume, blast-temperature and oil-consumption, and indicates combustion-air volume and oil-pressure. Signal lights for motors, ignition warning and other safety devices are also housed in this panel. Control

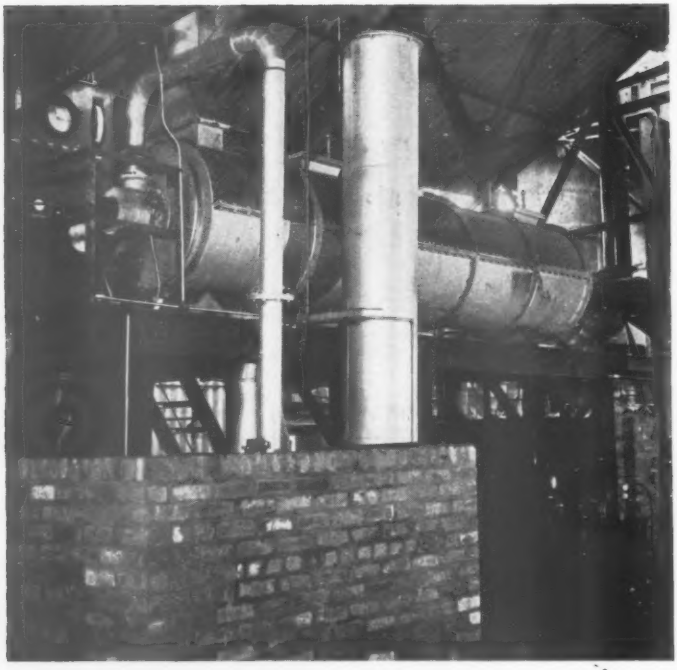
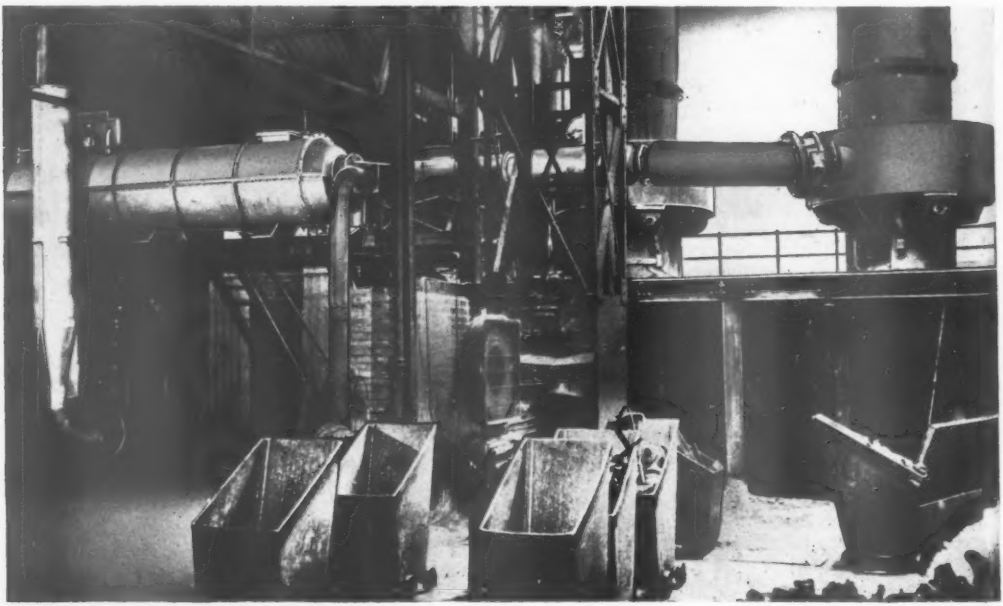


FIG. 1.—*Independent horizontal oil-fired cupola-blast heater, supplied to Brockmoor Foundry by Incandescent Heat Company, Limited.*

is effected by sequence operation of four push-buttons which put the plant into operation and maintain a pre-set blast temperature automatically. Fuel consumption is currently running at 10.2 gall. per hour of gas oil (diesel oil), obtained from a 1,000-gall. storage tank. Although creosote pitch might be a cheaper fuel to employ, it has been found that a deposit resulting from the combustion of this material coats the recuperator tubes and reduces efficiency. At present, 80 to 85 per cent. heat-transfer efficiency is claimed, and no fouling of the tubes occurs. Hot blast at 400 deg. C. is obtained in less than thirty minutes from "start up."

FIG. 2.—*Arrangement of the blast heater in relation to the existing cupolas and charging system. Note the economy in space utilized.*



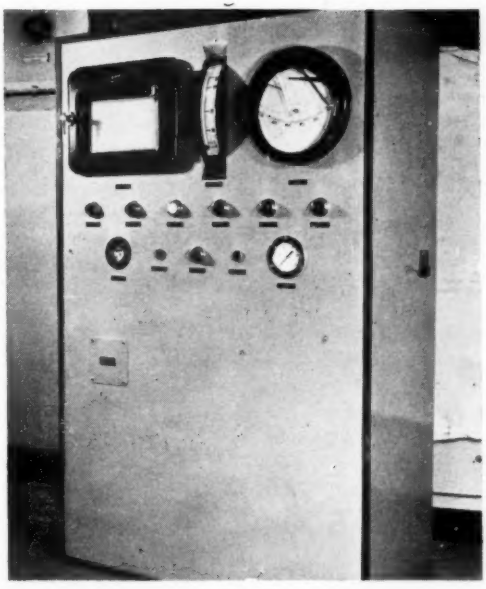


FIG. 3.—*Control panel for the hot-blast installation. At the top of the panel (from left to right) are the blast volume recorder; combustion air indicator, and the cupola-blast temperature recorder and temperature controller.*

Other Economies

Other comments made by the foundry personnel operating the plant include the statement that much better metal is secured right from the start of the "blow," *i.e.*, after clearing the first 3-cwt. of metal melted. Asked what was meant by "better metal," the statement was elaborated to the effect that, with hot-blast, metal is obtained of more consistent composition and this results in furnishing castings which are easier to anneal, *i.e.*, the better control permits the employment of metal of lower carbon and silicon than with cold-blast, the lowered silicon being most significant. An oil-heated receiver of 4-tons capacity is installed in front of the cupolas. The firm states that hot-blast working has resulted in a considerable reduction in the oil consumption at this receiver, due to higher metal temperatures as-tapped. Of the total monetary economy mentioned earlier, £300 per month represents the coke saving, £300 per month the reduction in ferro-silicon consumption, and the remainder is saved on ferro-manganese. The plant maintenance necessary when diesel oil is used is reported to be negligible, and the recuperator tubes have never become clogged or had their efficiency impaired by accumulations of furnace dust, as is the case reported with some hot-blast installations which employ cupola waste gases as the heating medium. To date, a record melt obtained from the plant is 45 tons in one day and this, from a 36-in. dia. cupola melting a high-steel charge, represents quite an achievement.

Shell Moulding

The shell-moulding section of the works is staffed by 9 men and 2 girls out of the total of 220 employed. It is variously illustrated in Figs. 4 to 11. There are two rotary four-station shell-moulding machines and one simple dump-box bench-type machine, all made by Polygram. Shell coremaking is also practised on a large scale using machines of the firm's own manufacture mounted on a rotary table, in addition to a Polygram core-blower. Patternplates, size 16 by 17 in. are in general use, typical examples of patterns, "biscuits" and finished castings produced by various methods at Brockmoor being shown in Figs. 12 and 13. At present, pre-coated sand/resin mixtures are employed and the firm is envisaging installing its own equipment for preparing sand of this type. Closing of the shells is performed by clamping and glueing—the latter on a Polygram diaphragm machine adapted to suit conveyorized working, in conjunction with a radiant-heat glue-setting stove. Biscuits are arranged vertically in boxes and backed with sand for pouring.

One of the first jobs produced successfully by the process at Brockmoor was a bevel-gear (Fig.

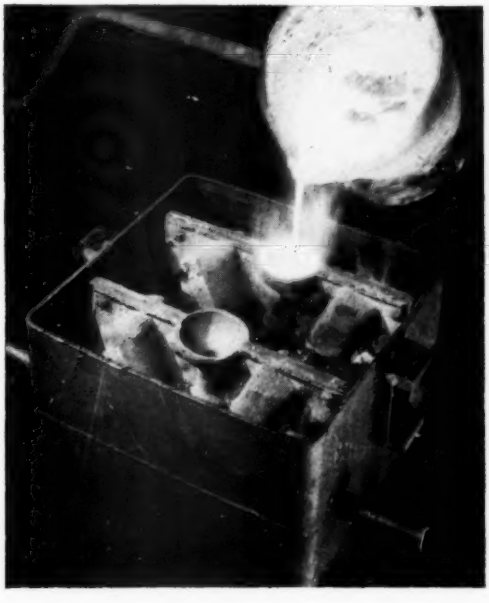
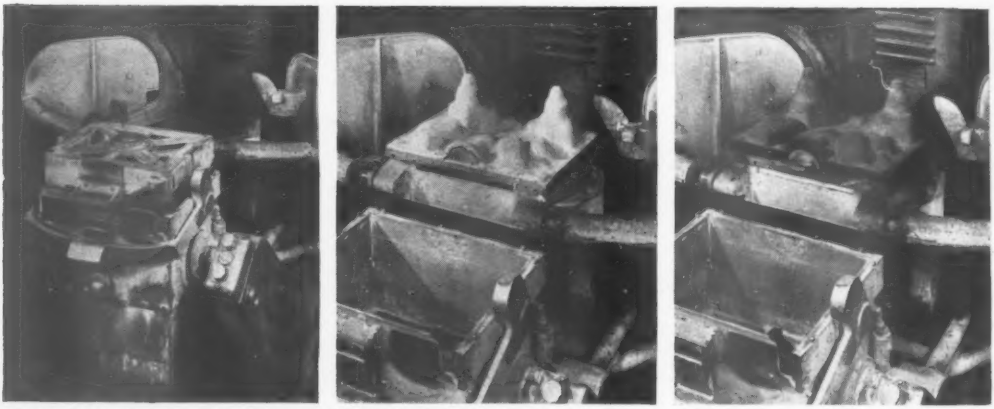


FIG. 4.—*Shell-mould assemblies are loosely packed with sand into moulding boxes in a vertical position for pouring.*

FIG. 5.—*General view of the Brockmoor Foundry shellmoulding section. One of the Polygram five-station machines is shown on the right, glueing of biscuits on the left and the glue-baking conveyor, centre.*



FIGS. 6, 7 AND 8.—*Stages in shellmaking:* (a) *pattern in position above the dump-box,* (b) *"green" shell withdrawn from the box and* (c) *cured shell ready for removal.*

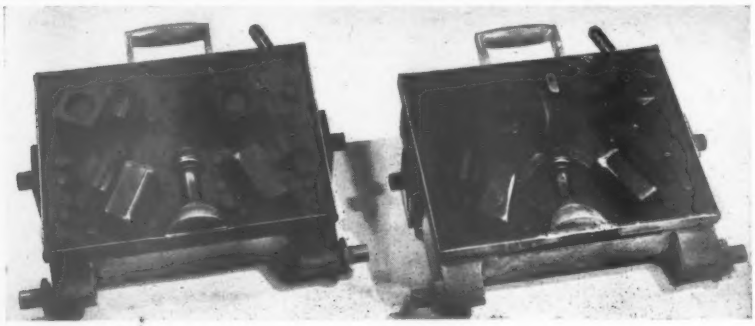


FIG. 9.—*Set of grey-iron patterns for shell-moulding. Individual patterns are mounted on a machined cast-iron plate and this in turn on a carrier frame which holds the ejection mechanism.*

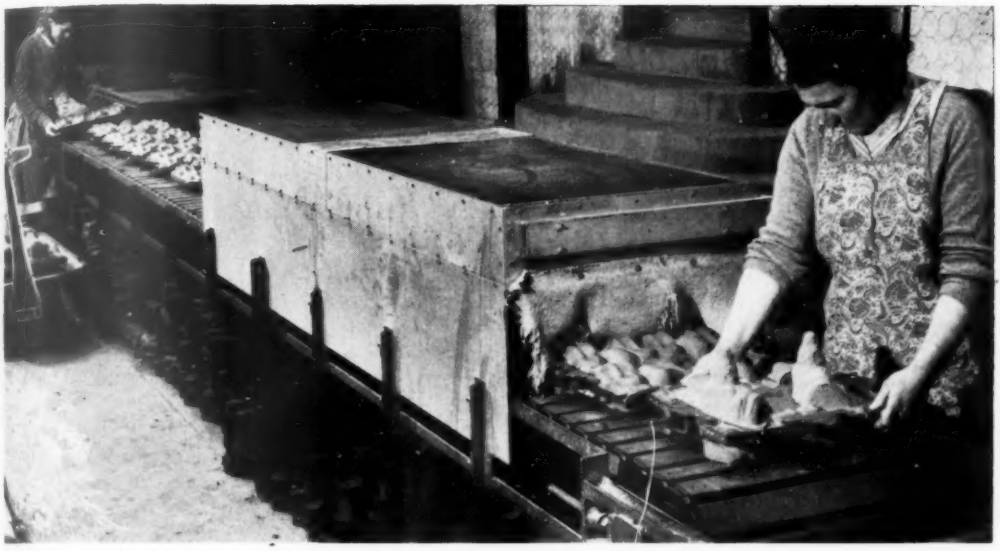


FIG. 10.—*Close-up of a slat conveyor and radiant oven used for glue-baking of shell assemblies.*

12) (with as-cast teeth) of which over a quarter of a million castings have now been made. When this job was previously made in ordinary sand moulds, the customer used to hob mill the teeth, but nowadays, using a shell-moulded casting, he only needs to face the bevel portion and bore the central hole.

Good Propaganda

On the question of the cost of shell moulding, the company takes the customer into its confidence and for this purpose has produced an excellent booklet which explains, *inter alia*, why sometimes this type of casting costs more initially—the price increase being between 5 and 20 per cent. in most cases. Patterns are also described as being more expensive (25 to 30 per cent.) for shell moulding but, as distinct from ordinary patterns or dies, they are claimed to have almost unlimited life. On the question of dimensional accuracy, limits of + 0.010 and — 0.005 in. are quoted for grey iron and ± 0.015 in. for malleable—these presumably being taken within the limits of the pattern sizes mentioned. The extra tolerance for malleable is explained as being due to very slight distortion during annealing. For shell-moulded jobs, the company like to undertake a minimum of 5,000 castings off a single item.

Speciality Castings

Concluding his tour of the works, the writer was interested to examine the range of blackheart and pearlitic malleable castings produced, examples of

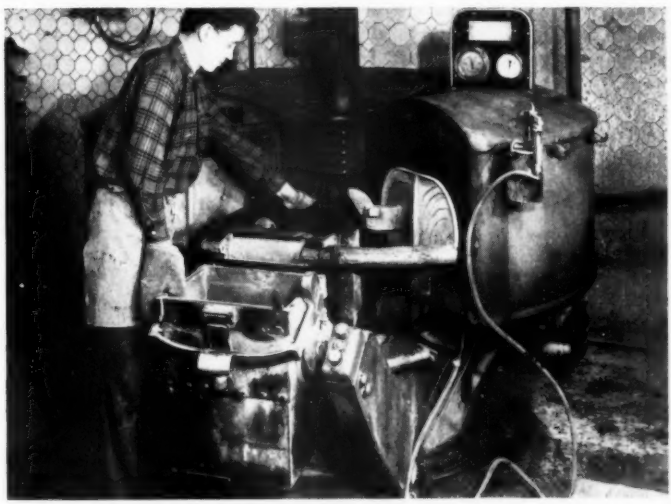


FIG. 11.—*Shellmaking machine: Operation one—swinging the patternplate (on hinges) over the "dump-box".*

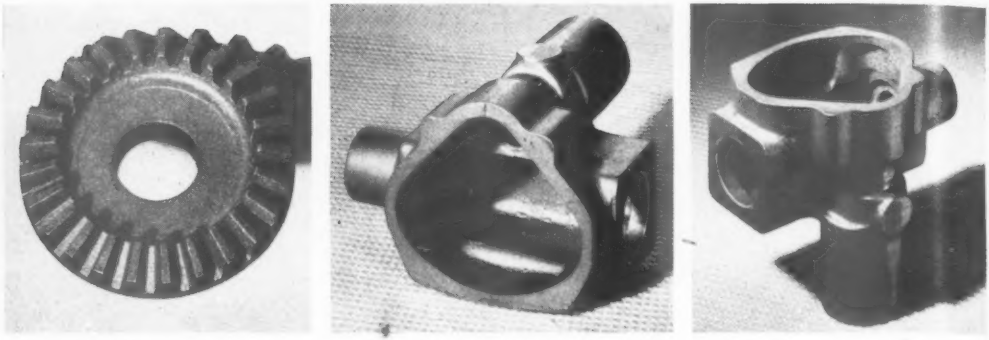


FIG. 12.—*Shell-moulded bevel gear, and two steering-gear castings, produced at Brockmoor Foundry.*

which are shown in Fig. 13. For castings which have to withstand severe wear, such as shotblast-machine parts, agricultural machinery components and blades for mixing- and pulverizing-machinery, the company has developed a special material under the name of "Brokolite." The Brinell Hardness normally attained by this material is over 500, but in parts of suitable design, up to 800 BHN can be secured. A speciality is also made by the firm of the production of light-, medium-, and heavy-duty bull-nosed bobbins for ships' hawsers. These are produced in pearlitic blackheart malleable, showing a tensile strength equivalent to cast steel and an elongation of from 5 to 7 per cent., combined with high resistance to abrasion and the quite slow corrosion of iron castings. Ships' toggle castings are also produced in large numbers in high-duty cast iron, and are available as a standard line, ex-stock. Yet another finished-goods line in production at Brockmoor is a quick-action clamping unit (somewhat resembling a machine vice) for use on assembly lines and for batch fitting in foundry and die-casting dressing shops, foundry coreshops, garages and welding shops. This novel device, which sits on a 12-in. base, has a maximum jaw opening of 5¼ in. Its production naturally provides a substantial outlet for the firm's heat-treated and machined castings and it is thus typical of the "bread-and-butter" lines of finished-goods which many founders find so profitable for ensuring a balanced "load" on the foundry.

FIG. 13.—*Group of typical high-duty castings of various types made in the Brockmoor works.*

Acknowledgment

In conclusion, the writer wishes to thank the directors of the Brockmoor Foundry Company, Limited, and the members of the staff, for the many courtesies shown during his visit, for help in preparing and illustrating this article and for making statistics freely available.

MOLINEAUX FOUNDRY EQUIPMENT, LIMITED, announce that Mr. Robert Carswell has been appointed as their agent in Scotland. Mr. Carswell is managing director of Care Foundry Products, Limited, 162, Burnside Road, Burnside, Rutherglen, Glasgow.

TO MARK the 21st anniversary of the firm's arrival in Grantham (Lincs) from London, the directors of R. H. Neal & Company, Limited, manufacturers of mobile cranes and contractors' plant, have given the sum of £500 to the firm's social and welfare club.

Congress Diary . . . By A. R. Parkes

Comment on Proceedings, Personalities and Events of the International Foundry Congress, 1958.*

Following the model of recent years, the writer has endeavoured to present a panoramic picture of the major activities of the International Foundry Congress, held under the auspices of the International Committee of Foundry Technical Associations in Brussels and Liège, from September 28 to October 3. As usual, the Congress provided a rendezvous for the meeting of many old friends and on this ground alone, can be considered an unqualified success. The generous hospitality provided by the host organization—Association Technique de Fonderie Belge—sometimes made it difficult to keep the meetings to schedule, but the programme on the whole was carried through well. Credit for this must be accorded to the president of the International Committee, Dr. G. Schwietzke, and to Mr. R. Doat, president of the local Association, the overall conception being admirably interpreted through the help of "Fabrimetal" and the secretary, Mr. A. Pirson, ably supported by a veritable army of willing helpers. To all these go the heartfelt thanks of those who participated.

Last week, divided between Brussels and Liège, Belgium, and under the royal patronage of His Majesty King Baudouin of the Belgians, the twenty-fifth annual congress of foundrymen, organized by the Belgian *Association Technique de Fonderie*, took place under the auspices of the International Committee of Foundry Technical Associations. It attracted about 1,100 participants from about 26 nations, the figure being made up of 940 listed in the booklet of names registered (which, of course, was printed before the Congress opened) and about 150 who registered late or for individual Congress functions only. (Amongst these, there was a party of about ten Russians and one Chinese from Formosa.) The number taking part, though believed to be somewhat smaller than last year's total in Stockholm, and considerably smaller than the 1956 total at Düsseldorf, was nonetheless gratifying to the organizers.

General

In general, the Congress was held in Liège, although it was officially opened in Brussels. With the exception of this opening ceremony, the technical sessions, banquet and closing ceremony all took place at the *Palais des Congrès* at Liège and most of the works visits (those by coach) also started from there. This congress building has been erected at great expense by the Liège city authorities in the expectation of securing a major share of European congress business. Its location along the Meuse at Liège is admirable for the purpose, being equally well accessible from many European countries.

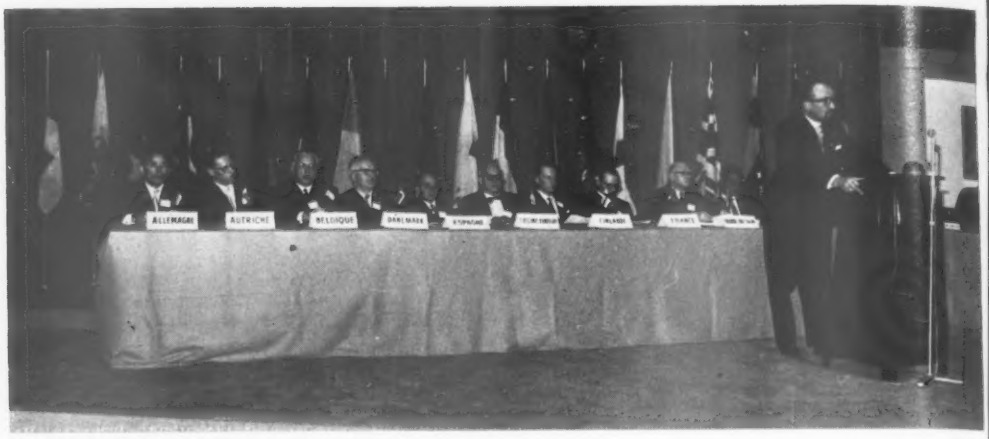
Accommodation provided at the *Palais* includes three very large separate lecture halls with tiered seats (each accommodating at least 200 persons), a banqueting hall which will seat about 1,000, spacious reception rooms and lounges, restaurant accommodation for about 300, and numerous well-appointed committee rooms, besides the usual cloak-rooms, offices, and very large car parks outside. This proved an ideal site for the Foundry Congress and its comfort was well-appreciated by the visitors—speakers representing more than one principal European nation were heard to deprecate the fact that there was no such similar rendezvous for conferences in their country. All the seats of each of the lecture theatres are equipped with built-in radio receivers and earphones, for the reception of the simultaneous translation of various languages employed by speakers and, on the whole, these worked very well. In addition, a flap on each seat provided a table for note-taking and, of course, the usual facilities—lanterns, screens, etc.—were available in each hall as required. Although the Palais des Congrès is not yet completed—during at least one lecture the "noises off" caused by someone somewhere laying a carpet were somewhat of a nuisance—the facilities are indeed excellent and the Belgians are certainly to be congratulated on their enterprise in providing and fitting out such magnificent accommodation.

Services

Daily, during the whole period, from Sunday, September 28 to Friday evening, October 3, a bureau, providing congress information, was open in the Palais des Congrès; there were also travel consultants, an exhibition of foundry literature, postal and telegraph and banking facilities.

On arrival at the bureau, each person who had

* Synopses of the majority of papers presented at the Congress appeared in last week's issue of this JOURNAL and abstracts of the remainder will be printed shortly.—EDITOR.



National representatives, members of the International Committee, seated on the left hand of the President's table at the opening ceremony in the Grande Auditorium.*

registered was furnished with an attractive folder of congress information (programmes, etc.); a linen-bound stiff-backed 750-page book of the collected papers to be presented; a lapel badge and male members were also given a commendably-large name-badge indicating the holder's nationality and languages spoken. Inside the folder was a writing pad, information about the attractions of the City of Liège and the Brussels Exhibition. There was also a season ticket provided for delegates to attend the Exhibition whenever they desired to do so around the period of the Congress.

Official languages of the Congress were English, French and German and any speaker was permitted to address his audience during the sessions in any one of these languages, the simultaneous radio translation giving the gist of his words in the other two. For the foundry congress, this translation work was very well done and contributed much to the appreciation, by all, of the various proceedings. In this respect, it is not out of place here to record delegates' thanks to the ten interpreters, headed by Mr. Cambrian of Brussels, who provided the service. Where the service "fell down" on one or two isolated occasions was only when the speaker himself, either by discoursing too loudly or indistinctly or by walking away from the microphones, created a situation very difficult to cope with.

Another service created for delegates was the issue to all of a daily illustrated *Journal du Congrès*, a newsheet giving information on events, completed and forthcoming, as well as ticket information, speakers' names, etc., all printed in the three congress languages. A certain number of separate copies of individual papers were also available on sale.†

The UK contingent participating in the Congress, making a total of about 90, was comprised largely of IBF members and their wives, who travelled to Liège on Sunday, September 28 (by rail/boat or by air) and returned on the following Sunday. This year, as distinct from recent congresses, there were no official post-Congress tours, though many delegates while in Belgium seized the opportunity to "kill several birds with one stone" and fixed up for themselves business commitments or visits to other works.

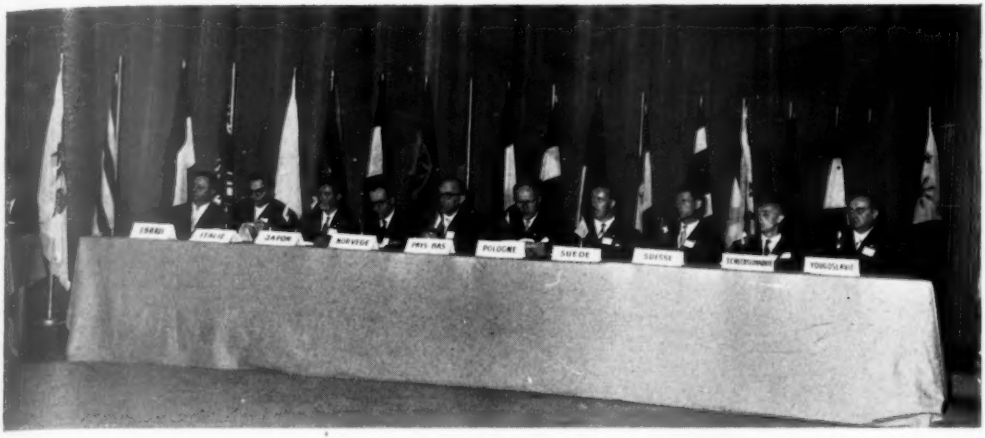
Opening Session

Seemingly because it is the capital city of Belgium and also because it houses this year the International Exhibition, the opening ceremony (Figs. 1 to 4) of the Congress was held in the city of Brussels, actually on the Exhibition premises. Here, an assembly in the *grande auditorium* of no fewer than 600 Congress delegates and ladies was present for the formal *Ceremonie d'Ouverture*. This necessitated many delegates making a two-hour coach journey from Liège to the Exhibition to be in time for the 11.30 a.m. opening ceremony.

Here, Mr. R. Doat (of the Conduites d'Eau concern), the president of the *Association Technique de Fonderie, Belgique*, and of the Congress organizing committee, welcomed delegates (speaking in French, German and then English) and delivered his opening address (the latter in French). For this, mimeographed copies in the three Con-

* This illustration and those on succeeding pages of this article are reproduced by courtesy of *Photo Congrès-Hersleven JRP Anvers.*

† As long as stocks last, individual papers presented (printed in English, French or German, as selected by the author) are available, price 25 Belgian Francs (about 3s. 8d.). Bound volumes of the papers may also be obtained, price 1,000 B.F. per copy. All these prices are plus postage as appropriate. Applications for copies should be addressed to the Congress secretary, Mr. A. Pirson, at Fabrimetal, 21, rue des Drapiers, Brussels.



Further members of the International Committee of Foundry Technical Associations making up the right hand wing on the stage during the opening ceremony.

gress languages were available so that everyone could follow.

Flanking the president's table on either side of the platform facing the audience at this meeting were the official delegates of the nations represented on the International Committee of Foundry Technical Associations: namely, representatives from Germany, Austria, Belgium, Denmark, Spain, USA, Finland, France, UK, and India on the audience's left and from Israel, Italy, Japan, Norway, Netherlands, Poland, Switzerland, Czechoslovakia and Yugoslavia, on the right. Supporting the president at the centre table were Mr. P. Van der Rest*, vice-president of the Federation of Belgian Industries, and Dr. G. Schwietzke, president, Dr. D. A. Dacco, vice-president and Mr. G. Lambert, secretary, respectively of the International Committee. The flags of the nations represented, and a large plaque of the Congress emblem provided, in essence, an impressive background of international co-operation.

President's Speech

In the course of his remarks, Mr. Doat defined a foundryman as being a man who must co-ordinate very many complex factors. "He must be a technician, a 'doer' and an artist; a real man who lives for his work and likes to communicate to others his enthusiasm for his creations." It was a great honour, Mr. Doat said, to welcome Mr. P. van der Rest, vice-president of the Federation of Industries in Belgium. In the name of all delegates present, he thanked him for accepting the invitation to attend, in spite of all his heavy duties, and for agreeing to make the opening speech. Mr. Doat also welcomed the representatives of the numerous foreign countries, whose presence, he said, gave the meeting its full brilliance. It was a pleasure to welcome those delegates who had come to the Congress, in some cases, from great distances and he made special mention to the president of the International Committee of Foundry Technical Associations, Dr. Schwietzke, and the other members of this Committee, its former presidents, and the official delegates of twenty foundry associations. Mr. Doat welcomed the presidents and co-presidents of the technical sessions, the scientific personalities, the lecturers and everyone who, in their own way, were contributing to the Congress. A special welcome was extended to the ladies.

For his chief subject, Mr. Doat said he was going to talk about Belgium's contribution to the foundry industry. Every foundryman knew that the first castings were made in non-ferrous alloys and Belgium had formerly possessed copper mines. Archaeological discoveries had proved that there has been an industry based on this metal in Belgium since the Roman period. The industry came down from the East and reached such a peak that the Belgian copper mines became exhausted in the 10th century. The necessity to buy copper and tin from England did not hinder metal-industry development and whilst during the 12th century the centre of the copper industry migrated from Huy to Dinant, the copper foundry still prospered in Huy. Mr. Doat referred to a copy of the baptismal font of the Saint Barthelemy church in Liège and urged delegates to take the opportunity of seeing this. The font, he said, is a casting of brass, made in Huy at the beginning of the 12th century and is considered by archaeologists to be the masterpiece of the medieval foundry in Western Europe. In Belgium, land of the famous carillons and carillon players, bronzefounders contributed much to the growth of bell founding. At Dony, a citizen of Liège found the means of producing metallic zinc at the begin-

* Also president of the Belgian Iron Industry Association.

ning of the 19th century. Thanks to this local discovery and the rich layers of calamine, the Liège founders accomplished a pioneer work in this metal.

Turning to non-ferrous metallurgy, Mr. Doat mentioned the first production of pig-iron and described the early methods and types of furnaces used. It was in the Liège area, he said, that the first vessels of thin cast iron were made using a zinc-containing iron ore. However, in the 16th century, Belgium lost its lead in the foundry industry, being overtaken by France and Germany during the 18th century and the European continent being outdistanced by England. Turning to foundry-industry developments in Belgium, Mr. Doat mentioned the use of hot blast in the cupola furnace, in about the year 1825 in a foundry in Liège. At the beginning of the 20th century, the Belgian foundry industry was exporting to all parts of the world and had regained much of the lost ground. The active participation of Belgium founders in the establishment of the International Committee of the Foundry Technical Associations—the first president was a Belgian, Mr. Paul Ropsy—supported this view.

Finally, Mr. Doat gave the assurance that the Foundry Technical Association of Belgium would not fail to make every effort to promote exchanges of views during the whole congress in an atmosphere as friendly and cordial as possible.

Committee's Welcome

At the next stage in the proceedings, Dr. Schwietzke addressed the assembly, expressing the International Committee's welcome. First, he made his opening remarks in French and then continued in German, also giving at its conclusion the gist of his peroration in English. These injections in the alternative official Congress languages were very helpful, but it was rather a pity that the instantaneous translation services were not available at this opening session as well as at the subsequent technical sessions.

Schwietzke's Speech

In formally opening the 25th International Foundry Congress, Dr. Schwietzke stressed that this was a Silver Jubilee function and that it coincided with a world reunion within the framework of the Brussels Universal Exhibition. As the theme of the Congress was the "Foundry in the Service of Mankind," it well matched the basic idea behind the Exhibition. He posed the question, "What are fundamentally the objectives in the evolution of humanity?" One answer was that man desires to live more comfortably, more freely and better. In the first aspiration, that is, to secure a longer and less dangerous life, man would find through modern techniques that there are means which would allow him to overcome the dangers threatening him from natural phenomena—fire, water, the depths of the

General view of the auditorium and stage at the opening ceremony of the International Foundry Congress at the Brussels Exhibition on September 29.

earth and from the sky. Conditions demand that if man would orient his greater leisure to useful pursuits, he could reach a rich harvest and no longer just eat, sleep and breed.

The history of human development taught that the first utilization of objects produced by nature was by chipping, thereby producing stone-cutting tools. Next came forging and milling. However, at an early age, came the smelting of ores with fuels, and pouring the liquid metals into moulds. Thus came the discovery of the founders' art, which constituted a major step and still is even important nowadays. Thus, there came into being a vast range of brasses, bronzes, and cast irons, malleable and highly-alloyed steels. The majority of people, he continued, had quite wrong ideas as to the importance of the foundry industry and its products. They saw buildings in concrete, glass, steel, light alloys and now there was talk of plastics. They forget, however, readily that nearly all machines—planes, motor transport, ships, lifts, etc., all needed castings as did that latest of all techniques, the harnessing of atomic energy for electric-power production.

The statistics of the foundry industry were impressive, Dr. Schwietzke concluded. Thus in Western Europe alone, in 1957, there were produced some 14 million *tonnes* of castings valued at something like £1,300 millions and employing some 760,000 workpeople. Obviously, such a vast turnover brought many problems demanding quick and economic solutions and the exchange of information in international circles ranked high amongst the best means of filling this need. His final message was "place the foundry at the service of mankind in a much greater measure than in the past, and place the most recent discoveries of science and technology at the service of the foundry." He then officially declared the Congress open.

To conclude the opening ceremony, Mr. Van der Rest, speaking for his senior, the president of the Belgian Federation of Industries, who had been prevented from attending, added his welcome and wishes for the wellbeing of the Congress members and their ladies. Towards the end of his remarks, he stressed the importance of the place of the foundry industry in its now modernized form in the general scheme of the countries' industry, welfare and economic set-up.

Then followed an official reception by the president and his wife, with a cocktail party, held in the *Palais d'Elegance*, which also formed part of the administrative buildings of the Brussels Exhibition. Here, the ladies of the party were each presented by their hosts (the Belgian *Association*) with a bottle of perfume and a gaily-coloured silk kerchief. This continued until the gathering broke up at about 2 p.m. for informal luncheon and individual tours of the Exhibition. Then, at 5, 8 or 10 p.m., according to desire, coaches were used to convey the whole party back to their hotels in Liège.

The writer's sole criticism of this opening ceremony is that the speeches were rather too long. Nowadays, it is the habit to present technical papers to Congress sessions only in abstract form and this might well be done with the speeches. It is somewhat boring and timewasting for anyone to sit listening to speeches in another tongue for long periods of time. Furthermore, the statements of the official speakers on this occasion were of such a high calibre that it would have been desirable for them all to be printed in full for studying at leisure. An obvious alternative would have been to hold the opening ceremony at the *Palais* in Liège, where ample accommodation, plus instantaneous translation service, were available.

(*To be continued*)

Groups of Congress delegates leaving the auditorium after the opening ceremony. In the foreground are Mr. and Mrs. J. Hill (East Midlands), Mr. A. Kirkham (Lancashire), Mr. and Mrs. John Bell and Mr. Dan Sharpe (Scotland).

Unemployment Rate Rises in Sheffield

Unemployment in Sheffield and district has risen sharply recently. At the quarterly meeting of the local employment committee, on Tuesday, the secretary, Mr. R. Downham, said that the unemployment percentage rate which, three months ago, was 0.9 per cent. below the national average had shot up to 2.3 per cent., 0.3 per cent. above the national average. The regional rate was 1.9 per cent.

Last quarter there were 2,353 persons wholly unemployed and 741 on short time. Now there were 3,184 wholly unemployed and about 5,500 are affected by short-time working in 34 establishments in the city. One of the principal features was the decline in the steel industry.

Mr. Downham later said that the percentages of unemployment might be a little misleading. Things were not so bad as they seemed and, in fact, of the 2.3 per cent. unemployed, only 1.1 per cent. were wholly unemployed.

A Note on Runners

By "Tramp"

The successful production of certain castings depends on the runner system used, for although a large number of designs can be produced by the use of various types of runners certain light castings can only be guaranteed sound if run at a specific place. This is because of the differential rate of cooling associated with certain runner systems and the resulting stresses are often sufficient to fracture the casting.

A typical example was encountered recently in a country jobbing shop and consisted of a thin cast-iron frame $\frac{1}{8}$-in. thick 2-in. deep with a series of $\frac{1}{4}$-in. square bars forming a grid on one face. The casting was 1-ft. 6-in. long and 1-ft. wide. When the pattern was received at the foundry it was considered an ordinary straightforward job and was given to a moulder who ran it by means of a thin deep runner at one corner. On turning out, the casting was found to have fractured at the opposite corner. The next casting was run by a series of thin cut-in runners at the side and the casting was removed from the mould in an apparently sound condition, but after fettling and laying aside for a while this too cracked at the corner.

It was now necessary to study the job before proceeding to make a further casting and it was found that in the first instance the metal entering the mould at one corner had to travel a considerable distance and was thus much colder when it reached the far end. The other end, near the runner, was far better and thus on cooling tended to pull from the other with the resultant fracture. In the second case, the metal had only to travel 1 ft. instead of 1 ft. 6 in. so the difference in the temperature at the sides was not so great, thus the casting came out in one piece but the differential cooling resulted in latent stresses which were released later. It was then obvious that the only way to run the casting successfully was by getting the metal to each corner at the same time so as to promote even cooling throughout. This was accomplished by a wedge runner direct on to a central bar.

Import of Plant and Machinery

Notice to Importers No. 866, dated July, 1958, announced the issue of Open General Import Licence (No. 2) permitting the import, without an individual licence, of certain chemicals (*a*) if they originate in the dollar area and are consigned from that area or from the relaxation area, or (*b*) if they originate in the relaxation area and are consigned from the dollar area. (These areas were defined in Notice to Importers No. 860, dated July, 1958). The Open General Licence (No. 2) has now been amended, to cover many items of plant and machinery including: cranes, including cranes mounted on road or railway vehicles; de-greasing machinery and plant; dust-extractor plant; electro-magnetic separators; foundry and die-casting machinery and equipment; rolling mill machinery; sand and shotblasting equipment; furnaces and parts thereof, other than of a kind used for domestic purposes; iron and steel (including alloy steel) manufactures, the following:—Castings except:—(*a*) anchors and (*b*) chain and chain cable of material under one inch dia.

Copies of the amendment, which is Amendment No. 1 to the Open General Licence (No. 2), may be obtained from H.M. Stationery Office, Kingsway, London, W.C.2, and branches.

ICI Sales and Profits

Group sales by Imperial Chemical Industries, Limited, to external customers in the first half of this year were £232,000,000, £4,000,000 higher than in the previous six months but £3,000,000 lower than in the corresponding period of 1957. Similarly, after tax and minority interests, the balance applicable to the company is £12,430,000, an increase of £510,000 on the previous six months, but lower by nearly £2,500,000 compared with the first half of 1957.

Trading conditions in the first half of 1958 were more difficult than in recent years, it is stated. There has been little change in total turnover of products manufactured by the group despite the commissioning of new plants. The decrease in group income before tax, compared with the first half of 1957, is principally due to the operation of some plants at lower outputs, to increases in wage and salary rates, and in fuel and transport charges, without corresponding increases in selling prices.

An interim of $2\frac{1}{2}$ per cent. for 1958, equivalent to the previous year's rate after adjusting for the one-for-two scrip issue, is being paid. The 1957 final was 8 per cent., equivalent to $5\frac{1}{3}$ per cent. on the increased capital.

Increase in Weekly Wage

Wage rate index for August 31 was 114, the same as in July and three points higher than in August last year (January, 1956 = 100). Just under 6,000,000 workers received an aggregate weekly wage rate increase of £1,731,000 in the first eight months of the year, compared with 10,865,000 and £4,526,000 for the corresponding period last year. During August there was a decrease of £700 for 9,000 workers.

The decreases, which operated under sliding-scale arrangements based on the official index of retail prices, affected a small group of iron and steel workers in the Midlands and iron-ore miners and limestone quarrymen in Cumberland.

Average weekly wage packets for men contained more than £12 13s. in April and for all workers more than £10 14s. In coal mining the average weekly cash earnings of male adults on April 26 were £16 4s. 3d.

About 3,405,000 working days were lost by 385,000 workers in 1,826 industrial disputes in the first eight months of this year, compared with 8,038,000 lost days, 1,209,500 workers, and 1,915 disputes in the corresponding period of last year.

Scottish Industries Fair

Plans are well advanced for next year's Scottish Industries Exhibition, which will be held from September 3 to 19, 1959, at Kelvin Hall, Glasgow. Although the lists have not yet been officially opened applications already received account for at least half the available space. No allocations will be made until everyone has had an opportunity of applying for space. A general committee for the exhibition has been formed, composed of 400 prominent Scots headed by Sir Robert Maclean.

The support of the Secretary of State for Scotland, and the President of the Board of Trade have been promised for the venture, and a world-wide publicity campaign is being prepared. A guarantee fund for £100,000 is to be launched to cover early promotion and construction costs. The exhibition will have as general manager Mr. Matthew Donaldson, who acted in that capacity at the two previous exhibitions in 1949 and 1954.

News in Brief

HATTERSLEY (ORMSKIRK), LIMITED, is having a new foundry built at Spring Hall Lane, Halifax, Yorks.

WALLACETOWN ENGINEERING COMPANY, LIMITED, are to extend their assembly department, containing the switchgear controlling the company's works, at a cost of about £1,860.

REFRACTORY MOULDINGS & CASTINGS, LIMITED, of Kegworth, announce that owing to expansion of business, they are moving to larger premises situated in Market Place, Kegworth.

BRITISH INSTITUTE OF MANAGEMENT, Management House, 80, Fetter Lane, London, E.C.4, announce the holding of a National Management Conference at Brighton from November 26 to 28.

IN ADDITION to the bus and truck contracts amounting to £3,000,000 announced by Leyland Motors, Limited, on the opening day of the Commercial Motor Show, the company has received from the Netherlands Railways a contract worth nearly £1,000,000 for 300 diesel buses.

ABOUT A DOZEN FOUNDRY WORKERS employed by Charles Wicksteed & Company, Limited, Kettering, commenced a four-day week last week. Mr. L. Wicksteed, managing director, dispelled rumours that the whole of the firm was effected, and said that only the foundry was involved.

FIRE BROKE OUT early on October 2 at Brown's Foundry Company, Limited, Nottingham Road, Derby, and about 150 sq. ft. of roof was damaged. Two Derby fire appliances dealt with the blaze, which was believed to be due to the nearness of a core oven to timber roof framework.

A PLANT to make town gas from heavy fuel oil by the Onia-Gegi process is to be built at Yaizu, Japan, by Humphreys & Glasgow, Limited, London, S.W.1. The new plant, which will be in operation by the winter of 1959, will comprise one unit of regenerative Onia-Gegi plant, with ancillary plant, and will produce 500,000 cub. ft. of gas per day.

HOPPER-BARNARDS, 175, Regent Street, London, W.1, announce that the new address of H. C. Hopper (Kingston), Limited, is No. 8 Factory, Mousehold Industrial Estate, Norwich. This now constitutes the pattern and machine shops (Telephone: Norwich 47247/8). The foundry is now Barnards Foundry Limited, Norfolk Iron Works, Coslany Street, Norwich (Telephone: Norwich 29041).

HENRY ROBB, LIMITED, Leith, have received orders for three cargo motorships, two of 3,400 tons gross and one of 2,600 tons gross, for Ellerman Lines Limited. Two are to be delivered next year and the third in 1960. The two larger ships will be 340 ft. in length and 54 ft. in breadth, and the other 300 ft. in length and 48 ft. 6 in. in breadth. All will have Sulzer-type propelling machinery.

THE LONDON HEAD OFFICES of Midland Silicones, Limited, will, on October 13, open in new and more spacious premises at 68, Knightsbridge, London, S.W.1. (Telephone: KNIghtsbridge 7801). The move has been dictated by the steadily increasing volume of business now being handled by the company—a member of the Albright & Wilson group and a UK associate of the American Dow Corning Corporation.

BRITISH WATERWAYS has placed orders with Thomas Smith & Sons (Rodley), Limited, Rodley, Leeds, for three electric 3/6-ton quay cranes to replace existing obsolescent hydraulic equipment at Regent's Canal Dock, and with Charles Hill & Sons, Limited, Bristol, for new gates at the entrance to Sharpness Docks and the Gloucester and Sharpness Canal from the river Severn estuary.

FOR THE SECOND TIME within a month David Brown & Sons (Huddersfield), Limited, has reduced hire-purchase rates on its agricultural tractors and farm machinery. The reductions affect equipment for which repayment is extended over periods of 18 months or two years. New interest rates are 9½ per cent. over 18 months (previously 10 per cent.) and 13 per cent. over two years (previous rate 14 per cent.).

TWO OVERSEAS ORDERS worth £300,000 have been awarded to Aveling-Barford, Limited, Grantham (Lincs), for earthmoving and quarrying equipment. The Ethiopia Highways Authority has placed an order worth about £200,000 for 30 motor graders with ancillary attachments, to be delivered over the next five months, and the Nigerian Railway Corporation has placed an order worth £100,000 for quarry plant.

A SEMINAR ON MANAGEMENT will be held in Sheffield on October 22 and 23 under the auspices of the British Institute of Management. There will be 20 places for senior line managers and specialists concerned with education and training. It will be led by Mr. E. H. van Delden, an adviser with the European Productivity Agency, and Mr. D. Courtenay Taylor, assistant director of the BIM for the past 18 months.

HAYWARD TYLER & COMPANY, LIMITED, a member of the Platt Brothers group, have received an order worth about £45,000 for four 400-h.p. glandless circulator pumps from Stein & Roubaix, of Paris. These units are for installation on a thermal boiler, working at near critical pressures, to be built in the Paris region. The company has recently appointed Ets. Ratier, of Montrouge, as the French licensees to handle further contracts of this nature.

A SMOKE-DENSITY TELESCOPE, designed at the Fuel Research Station of the Department of Scientific and Industrial Research, was shown last week at an exhibition in Llandudno, held in conjunction with the annual conference of the National Society for Clean Air. Smoke can be viewed through the telescope and its density compared with two translucent screens fitted in the body of the telescope and correspondending to No. 2 and No. 3 Ringelmann shades. The smoke and the screens are seen against the same background and estimations of darkness are at least as accurate as those made with the standard Ringelmann charts.

FOUNDRY EQUIPMENT, LIMITED, Leighton Buzzard, announce that they have added two further agents to their list of representatives throughout the World. *Colombia, South America*, Milciades Sanchez, Consulting Engineer, Av. Jimenez de Quesada No. 7-25, Edificio Faux, Officinas Nos. 415-16 (Apartado Aereo No. 4675), Bogota, Colombia, S. America. *Switzerland*, Alexander Britt, Romerstrasse 24, Winterthur, Switzerland. Readers in these countries interested in foundry plant and equipment should, therefore, note the above addresses and should communicate with these agents for any information regarding Foundry Equipment Limited products.

A FOUNDRY WORKER, Leonard Rogers, 6, Dale Street, Burton, who spilled molten metal on his foot and was burned because he was not wearing the correct protective clothing, unsuccessfully sued his employers, Lloyds (Burton), Limited, for £100 damages, including £34 11s. 3d. loss of wages, on the grounds of negligence. Rogers took off a sock and shoe at Burton County Court on October 1, to show the judge, Sir Henry

News in Brief

Braund, the scar left by the molten metal, which had trickled through the lace holes in his shoes. The judge did not accept that the metal went through the lace holes of the shoes, but said that, in his opinion, it had burned Rogers at a point at which the shoes ended.

INDUSTRIAL ACCIDENTS caused by falls could be eliminated if management played its part with absolute sincerity, said Mr. B. A. Inshaw, head of the industrial division of the Royal Society for the Prevention of Accidents, when he opened the recent exhibition. Dealing with main theme of the campaign, "Extra Care Stops Falls," Mr. Inshaw said that falls could be caused by bad lighting, bad planning or bad maintenance. Last year, in Leicestershire and Rutland, there had been 251 accidents through falls. This figure represented 16 per cent. of all industrial accidents in the area, and showed an increase each year, apart from 1955, since the "Safety Week" was instituted in 1950.

LEADERS OF MIDLAND MANUFACTURING CONCERNS attended a meeting in Birmingham on September 25, when the subject for discussion was the planning of a combined sales drive in the Canadian dollar markets. The drive is timed to start next May when the Birmingham Engineering Centre, in conjunction with the Board of Trade, is to stage an all-British engineering display at the National Industrial Production Show in Toronto. Efforts have been made to enable the small, and medium-sized engineering firms to take part in the project. Floor rent has been reduced to £1 (one pound) a square foot, including the cost of the stand. Among those present was Mr. Worden Evans, Canadian Trade Commissioner in Liverpool who said that no market in the world held out more attractive possibilities. He stressed, however, that competition was intense, and considerable sales effort would be necessary, coupled with an after-sales service.

Recent Wills

WILLIAMS, SIR PHILIP F. C., a director of Fine Castings, Limited, Bristol £131,691

WALLACE, ANDREW, retired ironfounder, of Aspley Guise, Bletchley (Bucks) ... £21,094

HARDILL, ARTHUR, former director of W. Hardill Sons & Company, Limited, saw mill engineers, of Cleckheaton (Yorks) ... £12,269

GENTLE, A. M., retired ironfounder and engineer, former senior partner in C. Gentle & Son, engineers' merchants, of St. Albans (Herts) ... £24,253

BLYTHE, COL. F. E. F., late chairman and a managing director of William Blythe & Company, Limited, manufacturers of industrial chemicals, of Church Accrington (Lancs), and chairman and managing director of John Riley & Sons, Limited, chemical manufacturers, of Hapton, Burnley ... £285,620

Latest Foundry Statistics

Light alloys: The Ministry of Supply inform us that the production of aluminium alloy castings in July was:—sand-cast, 1,408 tons; gravity-die-cast, 3,288 tons, and pressure-die-cast, 1,280 tons. The output of magnesium-alloy castings was reported as 153 tons.

Mr. GEORGE S. COPE, after three years with the company, has been appointed general manager of Freeman Taylor Machines, Limited, stainless-steel fabricators, Leicester, and will be responsible for sales and production.

AEI and W. T. Henley's Telegraph Works to Merge

Negotiations to amalgamate cable and other manufacturing resources have been concluded by the boards of Associated Electrical Industries, Limited, and W. T. Henley's Telegraph Works Company, Limited. The amalgamation will be effected by AEI offering to purchase the whole of the issued capital of Henley's and the new group will account for over 20 per cent. of cable production for the UK home market.

Lord Chandos, chairman of AEI, said recently that it was not a take-over bid nor a financial or share deal, but an industrial amalgamation designed to meet the needs of the cable industry. The main problem confronting the industry had been excess capacity—a long-term problem independent of current world-wide industrial recession. In those circumstances it was undesirable to have too many competing companies spending capital. The amalgamation was, in fact, an ambitious move towards rationalization of the operations of the industry, a process which was expected to take two or three years.

Rationalization would take four main forms—a saving in capital expenditure, a reduction in the present extreme variety of cables being produced, a saving on research and development, and certain supply contracts could be spread over a larger manufacturing base than either concern could provide independently.

The identity of Henley's would be retained after the amalgamation and the board would remain in being.

Iron-ore Imports

Iron-ore imports in August, and the totals for the first eight months of this year and last, are shown below.

From	Month ended August 31.	Eight months ended August 31.	
	1958.	1957.	1958.
	Tons.	Tons.	Tons.
Sierra Leone	60,280	505,671	510,286
Canada	262,989	1,753,641	1,383,022
Other Commonwealth countries and Eire	—	13,682	2,397
Sweden	214,950	2,686,279	2,250,650
Norway	12,687	167,479	197,710
Western Germany	—	17	5,115
France	31,136	418,292	341,401
Portugal	10,667	92,746	92,580
Spain	33,209	760,669	447,342
Algeria	82,414	1,009,231	1,029,210
French West Africa	13,515	442,717	279,560
Tunisia	29,515	479,251	411,287
Northern Morocco	8,840	171,417	107,058
Southern Morocco	13,740	254,417	261,205
Liberia	—	253,598	196,219
Venezuela	86,942	755,651	1,059,434
Brazil	49,265	465,239	395,910
Other foreign countries	9,135	67,959	172,363
TOTAL	919,284	10,297,956	9,142,699

Teesside to have New Steelworks

Members of Middlesbrough Town Planning Committee were informed at their meeting recently that W. Shaw & Company, Limited, steelfounders, of Middlesbrough, had bought the old Acklam foundry.

The firm stated that it planned to "rebuild a completely new steelworks on the site."

Electrical Aids in Industry *Data Sheet* **No. 1**

Electro-Heat

The ways in which electricity can be used to advantage in industry are many and varied. Some are well known but others are not known well enough. For this reason the Electrical Development Association has prepared a series of detailed data sheets on various applications which will be printed in this journal from time to time.

All the applications of electro-heat have these advantages in common :—

1 Electro-heat is clean both in regard to its application and the method of generation.

2 It can easily be controlled more precisely than any other form of heat, manually or automatically.

3 It can be brought to the job instead of having the job brought to it.

4 It permits better use of floor space and the elimination of unnecessary handling.

5 In many of the newer processes it is the only possible form of heat which can be used.

6 It often ensures a higher quality of products with fewer rejects.

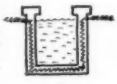
7 It gives the best working conditions.

8 It effectively reduces or eliminates fire and explosion hazards.

Below will be found brief notes on some of the various methods of generating heat by electricity.

Resistance Heating

This is the best known form of electric heating. The elements provide a high resistance to the passage of electricity and thus heat is generated. It can be used in furnaces for melting or heat treatment of any material whether metal or not, or the resistance of the workpiece itself can cause the generation of heat.

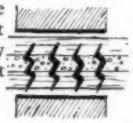


Induction Heating

Eddy currents are induced in the surface of a conducting workpiece, heating it up. The depth to which this heating will penetrate is determined by the time it is given.

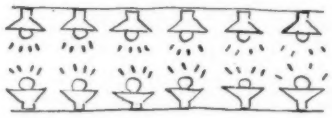
High-frequency Dielectric Heating

This form of electro-heat can be used only on non-conducting materials such as wood, plastic and rubber. The material is placed between two electrodes to which a high voltage is applied at a high frequency. This has the effect of generating heat inside the material rapidly and uniformly throughout its entire thickness.



Infra-red Heating

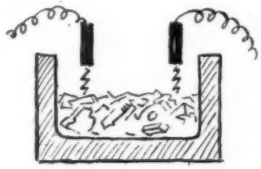
This method employs pure radiant heat. The bulk of the radiation takes place in the infra-red portion of the radiation frequency spectrum. The heaters may take the form of reflector lamps or sheathed wire elements. The method is extremely flexible and has many uses, including paint drying and pre-heating plastics.



Arc Melting

This form of heating is chiefly used for melting steel. The diagram illustrates one method of operation.

Very large charges can be melted; melting units of 200 tons capacity are now in operation.



The Application of Electro-Heat

All these methods of electric heating can be applied in almost an infinite variety of ways. Some of these ways will be dealt with in subsequent sheets.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2.

Excellent reference books on electricity and productivity (8/6 each or 9/- post free) are available — "Induction and Dielectric Heating" is an example; "Resistance Heating" is another.

E.D.A. also have available on free loan a series of films on the industrial use of electricity. Ask for a catalogue. 4889/4

Personal

Mr. J. W. WAGSTAFF has received a presentation on his retirement from the post of cashier with Hadfields, Limited, the Sheffield steelmakers, after 59 years' service. He joined the company at the age of 13

Mr. HERBERT HORNE retired recently after 57 years' service with Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield. Aged 70, he had been employed in the heavy construction machine and fitting shop for the past 20 years or so.

Consequent upon the appointment of Mr. W. E. Ward as a director and general manager of the Consett Iron Company, Limited, Mr. S. C. PEARSON has been appointed assistant general manager and Mr. G. F. EWAN general works manager (production).

Mr. WILLIAM JEFFREY, who held the position of pin-shop supervisor at Ewart Chainbelt Company, Limited, Derby, has retired after 51 years' service with the company. He received a gift of money from Mr. J. Carruthers, works manager, on behalf of the staff and colleagues.

Mr. D. J. C. ROBERTSON, a director of the Metropolitan-Cammell Carriage & Wagon Company, Limited, has been appointed general manager. Mr. J. L. R. BARNES has been appointed a special director and chief engineer, carriages and wagons, and Mr. C. J. E. LARGE chief engineer, railcars.

Mr. F. CORKER, assistant secretary of the Staveley Iron & Chemical Company, Limited, has been appointed secretary. Mr. A. E. BIGGS has resigned as secretary, but will remain an executive director with special responsibility for financial matters and the accounts of the company.

Mr. K. H. COOMBS, senior vice-president of the South African branch Institute of British Foundrymen, has joined Scaw Metals, Limited, South Africa, as assistant foundry manager (shell moulding and process development); he was formerly with Polygram Shell Mould Company (Pty.), Limited.

Mr. A. W. FERGUSON, chief accountant of William Beardmore & Company, Limited, steel manufacturers, of Glasgow, has been appointed secretary in succession to Mr. D. M. CAMERON, who has relinquished the secretaryship on reaching retirement age. Mr. Cameron retains his seat on the board.

Mr. R. GOODBURN, export sales manager of the Surform division of Simmonds Aerocessories, Limited, Treforest, Glam., is to visit the company's agents and customers in Germany early in November. He will be accompanied by Mr. P. W. Newby, the publicity manager of the Firth Cleveland group, of which Simmonds Aerocessories is a member.

Mr. C. CAMPION, head of the erection department, and Mr. W. E. ALLEN, a moulder in the foundry, have both completed 50 years' service with Herbert Morris Limited, of Loughborough. As a memento of this occasion Mr. Frank Morris (chairman) presented Mr. Campion with a combined television and radio set, and Mr. Allen with a gold watch, on behalf of the directors.

Mr. F. H. CLEWS, assistant director of research of the British Ceramic Research Association, is the new president of the British Ceramic Society. Among the posts held by Mr. Clews have been those of Lecturer in Chemistry at the North Staffordshire Technical College, principal of the Burslem Wedgwood Institute, and a member of the staff of the British Refractories Research Association. He has been secretary of the building materials section of the British Ceramic Society for 26 years.

Dr. R. BEECHING, technical director of Imperial Chemical Industries, Limited, Mr. J. M. WILLEY, a director of Murex Welding Processes, Limited, and Mr. T. M. HERBERT, director of research, British Railways division of the British Transport Commission, have been elected members of the Council of the British Welding Research Association. Mr. J. STRONG, this year's president of the Institute of Welding, will represent the Institute on the Council of the Association during the year 1958-1959.

Obituary

Mr. H. M. ROBERTS, a former medical officer of the explosives group of Imperial Chemical Industries, Limited, died on October 1. He was 80.

The death occurred on September 26 at the age of 65 of Mr. CHARLES THOMSON, a director of F. R. Cass, Limited, iron founders, Britannia Foundry, Bury (Lancs).

Mr. PHILIP BRADFORD NILES, a vice-president and a director of the Yale & Towne Manufacturing Company, died in New York on September 24, after a long illness. He was 56. Mr. Niles joined Yale & Towne as a vice-president in 1949 and was elected a director of the company in 1956.

The death occurred on September 24, at the age of 76, of Mr. A. E. LAKE, who was for many years director of Thomas Lake & Company, Limited, iron-founders, Newport, Barnstaple. The firm was founded by his father, the late Mr. T. Lake. Mr. A. E. Lake retired from active business 10 years ago.

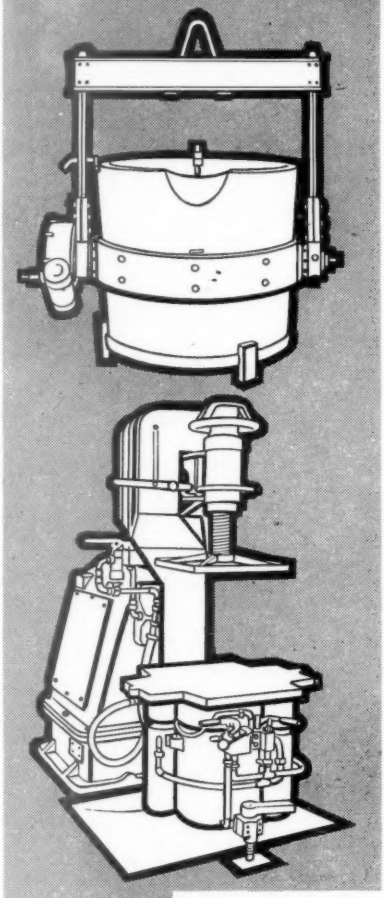
The death occurred recently at the age of 62 of Mr. Frank Shepley, joint managing director of H. Scott Sunderland, Limited, South Edge Ironworks, Hipperholme, Halifax. He was also chairman of directors of Frank Shepley, Engineers (Hyde), Limited, Cheshire, and a director of the Werneth Engineering Company, Limited, Hyde.

Mr. ARTHUR GEORGE DOWNING, joint managing director of N. Downing & Sons, Limited, ironfounders, of Clarence Foundry, Stockton-on-Tees, died on September 22 at the age of 75. Mr. Downing was the first secretary of the firm when it was made a limited company in 1915, 40 years after it was founded, and he held this position until a few months ago. He was a member of the Institute of British Foundrymen.

The death occurred suddenly on September 29 of Mr. F. A. SPENCE-BROWN, a joint managing director of Johnson, Matthey & Company, Limited, precious metal smelters, refiners, and engineers, etc., of London, E.C.1. He was also a director of Mallory Metallurgical Products, Limited, Harlow Metal Company, Limited, and a number of other companies. The death of Mr. E. G. Pickering, who was also a joint managing director of Johnson, Matthey & Company was also announced recently.

After a long association with the steel industry in Sheffield and Hongkong, Mr. P. B. PARKS has died at the age of 64. He received his early training in metallurgy at Sheffield University and gained practical experience with Thos. Firth & John Brown, Limited, the Steel Peech & Tozer branch of the United Steel Companies, Limited, and Joseph Rodgers & Sons, Limited. He was later appointed metallurgist and foundry manager of the Hongkong & Whampoo Dock Company, Limited, which post he held for 17 years.

TWW FOUNDRY PLANT



The following Selection is available from stock subject to remaining unsold :

UNUSED TYPE HPL3 PNEUMATIC JOLT SQUEEZE STRAIGHT DRAW MOULDING MACHINE by B.M.M. Co. Ltd.; jolt load 600 lbs., pattern draw 9in., squeeze pressure 14,000 lbs., pattern table 36in. by 25in.

MUMFORD TYPE PLAIN JOLTER, SIZE No. 6, 20in. by 30in. table, capacity 1,500 lb., diameter of cylinder 6in.

B.M.M. TYPE AT1 MOULDING MACHINES; load 300 lbs.; pattern draw 6in.; pattern table 30in. by 21in.

UNUSED ROTARY OIL FIRED SAND DRYER : capacity 1 ton per hour. Fitted with Rotovac No. 1 Oil Burner and Motor Driven Fan with Starter suitable for 400-440/3/50. Arranged for direct drive through gearbox. All mounted on combined baseplate.

CRUICKSHANK CLEANING AND POLISHING RUMBLING BARREL, approx. 38in. long by 26in. across flats which have ¼in. dia. perforated holes. The barrel is supported by trunnions and runs in an enclosed tank holding liquid abrasives. Chain driven from 2 h.p. self-contained motor reduction gear box wound suitable for 400-440 volts, 3-phase, 50 cycles supply.

NEW POLFORD OIL FIRED CENTRAL AXIS TILTING FURNACE, 250 lbs. melting capacity; complete with Oil Burner and Motor Driven Fan suitable for 400-440/3/50.

UNUSED SIZE NO. 'O' FIXED TYPE CUPOLETTES by J. W. Jackman & Co. Ltd., each having a capacity of approx. 10/15 cwts. per hour. Shell 27in. dia.; height of stack 7ft. 6in.; complete with Blowing Fan driven by 3 h.p. Squirrel Cage Motor wound suitable for 400-440/3/50 cycle supply. Together with charging platform, stand for Fan with connecting piping and lining for the cupolas.

COLEMAN WALLWORK TYPE CN JOLT SQUEEZE RAM PATTERN DRAW MOULDING MACHINE, load 600 lbs.; pattern draw 10in.; suitable for boxes 20in. by 20in or 25in. by 12in.

NEW "FORWARD" FOUNDRY SAND RIDDLE, capacity approx. 5 tons per hour. Driven by one-third horse-power totally enclosed motor, wound suitable for 400-440/3/50. Complete with tubular steel tripod.

SHOT BLAST PLANT : RUMBLING BARRELS : FURNACES : AIR COMPRESSORS AVAILABLE FROM STOCK.

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PP.19

Raw Material Markets

Iron and Steel

Demands for all grades of pig-iron continues on a moderate scale and there is no appreciable increase on recent deliveries. Outputs are in excess of consumption, although in some irons production is now at lower levels, mainly basic steelmaking pig-iron and high-phosphorus irons. Stocks of all grades at the furnaces are at present fairly high and continue to increase. With reduced output of steel, the use of basic pig-iron has declined appreciably and tonnages now available are more than adequate, even though some furnaces previously producing this grade are now out of blast and others are on reduced outputs.

In the foundry pig-irons, the high-phosphorus grades are in least demand. Orders arising are far too few to absorb outputs, and appreciable quantities have to be placed into stock at the furnaces. Hematite and refined irons are also plentiful.

All the foundries are in need of more work, although some are more favourably placed than others. The engineering and speciality foundries manage to maintain a fairly good level of production of high-quality castings, but overall demands are not so large as they were some time ago. The motor-car trade keeps up a steady demand, and other users, including machine tool and agricultural implement makers, heavy engineering, power and electrical plant manufacturers, collieries, steelworks, etc., combine to take up fairly appreciable tonnages of castings.

The light-castings trade has been very quiet for some considerable time, but there are now reports of some improvement in demand for castings for domestic equipment, on account of reduction in stocks. It is hoped that this trend will continue and extend to other trades which have been affected adversely by the financial and credit restrictions.

Apart from the better and heavier grades of cast-iron scrap, supplies of all other types are plentiful and the foundries are well provided. Foundry coke deliveries are satisfactory and ganister, limestone, and firebricks can be obtained to requirements.

There is no general improvement in trade at the re-rollers, and business is very spasmodic. Some mills are obtaining good outputs of reinforcing rods and, while there has been some improvement in the demand for small bars and light sections, the orders are still insufficient to enable the mills to work anywhere near capacity levels, and most of them continue to work on short time. Export business is scarce, due to the severe competition from makers overseas.

Steel semis are plentiful, and home steelworks could increase considerably on present deliveries if demands warranted.

Non-ferrous Metals

The ink was hardly dry on last week's copy when the US price structure for non-ferrous metals exploded, resulting in rises in the quotations for copper, lead, zinc, and tin.

In copper, demand in the US has risen to fresh high levels and the US custom smelters increased their price by ½ cent to 27 cents a pound—the second rise in the quotation since the end of August. Notwithstanding the current high level of demand, a continuance of the special outside bullish factor is playing its part in nudging prices to higher levels. Although the general atmosphere on the Copperbelt is now conducive to a settlement of the present strike, the fact is that all mining operations are at a standstill and that, coupled with the strike at the International Nickel Company of Canada, a buoyant Wall Street, and a continued improvement in the US economic position more than offsets the facts of high stocks and increased annual rates of US production. The primary producers' price remains at 26½ cents a pound, although indications are that a further ½ cent increase in the quotation is not far off. One of the most encouraging features of US buying is the growing interest by consumers in replenishing their inventories.

In the UK the picture, despite the gentle, but consistent, rise in price, looks sombre compared with that on the other side of the Atlantic. This can be traced to the fact that soft spots in the economies of the UK and other European countries point to a diminished rate of demand over the next few months. Nevertheless, the current low level of consumer demand in the UK and on the Continent is outweighed by the tightening supply position in the United States and the decreasing stocks in LME warehouses, which currently stand at no more than 9,989 tons.

The outlook for the copper price will therefore be dictated by market considerations in the United States. In this connection it must be pointed out that, although very large stocks overhang the market, these are well held, and with current demand well ahead of current production, stocks are decreasing sharply. A continuation of the present level of US demand, and assuming no immediate change in the strike position on the Copperbelt and in Canada, must result in the UK price following the same course as that of its American counterpart.

Tin seems to have got over its recent bad patch, and with demand noticeably better in the UK, in the East, and in the United States, the London cash and three months' price are now well clear of the support point level of £730 a ton. Indeed it would appear that buyers from these three sources are being forced to buy because of the shortage of available supplies and this is coming on top of a market shortage resulting from 10 months' restrictions. The whole market has, of course, benefited from the Russian promises to restrict exports. In the United States the price is around 97 cents a pound. In the UK stocks at the end of last week totalled 17,514 tons.

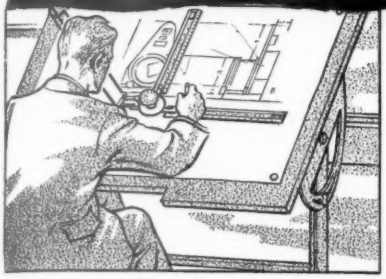
Lead, too, has shown a revival. In the United States demand has been good, good enough at any rate to absorb two ½-cent increases in the price of 12 cents a pound, New York. This is encouraging. But such a rapid rise in the quotation seems difficult to justify in view of the very large stocks available and the low level of demand for the metal outside of the US. In any event, the UK price now is more than a few points above the £70 a ton level.

Zinc has also shared the same experience as the other metals and the East St. Louis price has been raised by two successive ½-cent increases to 11 cents a pound. Like lead, however, stocks are high and outside the United States demand is only of a routine nature so that the price advances for these two metals tend to be suspect and may, therefore, be difficult to maintain.

UK Ovens for African Foundry

Foundry & Engineering Company (West Bromwich), Limited, has received an order to a total value of about £50,000 for four large "Acme" vertical conveyor ovens for the South African Railways' new foundry at Koedoespoort. When completed, this core-oven installation will be the largest in South Africa. The contract, in common with other export orders for the firm's ovens, was obtained by successful tender in the face of substantial foreign competition.

Specially designed...



...for the smaller foundry

The Turbo 60 Rotating Drum Airless Shot Blast Machine is for use in the smaller foundry. The machine gives high performance at low cost and satisfactorily shotblasts a variety of parts in all metals. If you would like more information about this machine, why not write to us today?

- ★ Effective load—88 to 132 lb.
- ★ Output up to 15 cwts. per hour.
- ★ Primary de-sanding device if required prior to shotblasting.
- ★ Highly efficient Rotor Injection Airless Impeller.
- ★ Total H.P.—4¾ (including Dust Filter).
- ★ Easy to maintain.
- ★ Low cost per ton output.

Send the coupon or write to us

to

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Engineers

FOUNDRY MACHINERY DIVISION, BEDEWELL WORKS, HEBBURN ON TYNE, CO. DURHAM. *Tele. Jarrow 89-7124*

Please send me information and your illustrated leaflet on the
TURBO 60 ROTATING DRUM MACHINE

Name..... *Status*.....

Address..... *Country*.....

Current Prices of Iron, Steel, and Non-ferrous Metals

(*Delivered unless otherwise stated*)

October 8, 1958

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.75 per cent. P, £23 17s. 0d., delivered Birmingham. Staffordshire blast-furnace low-phosphorus foundry iron (0.10 to 0.50 per cent. P, up to 3 per cent. Si), d/d within 60 miles of Stafford, £24 1s. 3d.

Scotch Iron.—No. 3 foundry, £25 3s. 6d., d/d Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 19s. 0d.; South Zone, £26 1s. 6d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £27 6s. 6d.; South Zone, £27 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent.: N.-E. of England (local iron), £25 6s. 6d.; Scotland (Scotch iron), Zone S.1, £25 13s. 0d.; Sheffield, £26 15s. 0d.; Birmingham, £27 4s. 0d.; Wales (Welsh iron), £25 6s. 6d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leics.

FERRO-ALLOYS

(*Per ton unless otherwise stated, delivered*)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £44 0s. 0d. to £44 10s. 0d., scale 15s. 0d. per unit; 75 per cent. Si, £62 0s. 0d. to £62 10s. 0d., scale 17s. 0d. per unit.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 6d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 6s. 6d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 9s. 6d. per lb. of W.

Ferro-chrome (6-ton lots and over).—4/6 per cent. C, £83 10s. 0d. to £87 0s. 0d., basis 60 per cent. Cr, scale 30s. 0d. to 30s. 6d., per unit; over 6 per cent. C, £79 10s. 0d. to £85 0s. 0d., basis 60 per cent. Cr, scale 30s. 6d. per unit; 2 per cent. C,* 2s. 0d. per lb. Cr; 1 per cent. C,* 2s. 0½d. per lb. Cr; 0.15 per cent. C,* 2s. 1½d. per lb. Cr; 0.10 per cent. C,* 2s. 1¾d. per lb. Cr; 0.06 per cent. C,* 2s. 2d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, £265 0s. 0d.; 96/98 per cent., £295 0s. 0d.

Ferro-columbium.—65/72 per cent., Nb + Ta, 19s. 9d. per lb., Nb + Ta.

Ferro-manganese (home).—78 per cent., £78 0s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., £32 15s. 6d.; tested, 0.08 to 0.33 per cent. C, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), £34 17s. 0d.; silico-manganese, £43 16s. 6d.; free-cutting, £36 14s. 6d. SIEMENS MARTIN ACID: Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese, £44 4s. 0d.

* Average 68-70 per cent.

Billets, Blooms, and Slabs for Forging and Stamping.—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections.—Ship plates (N.-E. Coast), £42 2s. 0d.; boiler plates (N.-E. Coast), £44 12s. 0d.; floor plates (N.-E. Coast), £43 11s. 0d.; angles (N.-E. Coast), £39 16s. 6d.; joists (N.-E. Coast), £39 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £40 0s. 6d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, £39 0s. 0d.; uncoated strip mill coils, hot rolled, under 3mm. to 12g., £44 16s. 0d.; black sheets (hand mill), 24g., £58 14s. 6d.; galvanized corrugated sheets, 24g., £66 16s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d.; nickel-chrome, £99 11s. 0d.; nickel-chrome-molybdenum, £111 19s. 0d.

NON-FERROUS METALS

Copper.—Cash, £223 10s. 0d. to £223 15s. 0d.; three months, £219 10s. 0d. to £220 0s. 0d.; settlement, £223 15s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 1½d. per lb.; rods, 231s. 6d. per cwt. basis; 20 s.w.g., 266s. 6d. per cwt.

Tin.—Cash, £739 0s. 0d. to £740 0s. 0d.; three months, £733 0s. 0d. to £733 10s. 0d.; settlement, £740 0s. 0d.

Lead (Refined Pig).—First half October, £71 10s. 0d. to £71 15s. 0d.; first half January, £72 7s. 6d. to £72 10s. 0d.

Zinc.—First half October, £66 15s. 0d. to £67 0s. 0d.; first half January, £66 5s. 0d. to £66 10s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £101 5s. 0d.; rolled zinc (boiler plates), all English destinations, £99 0s. 0d.; zinc oxide (Red Seal), d/d buyers' premises, £87 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 1s. 8½d. per lb.; sheets to 10 w.g., 182s. 9d. per cwt.; wire, 2s. 6d.; rolled metal, 182s. 9d. per cwt.

Brass (Brazing).—BS1400, B3 (65/35), £142; B6 (85/15), £185; BS249, —.

Brass (High Tensile).—BS1400, HTB1 (30 tons), £177; HTB2 (38 tons), —; HTB5 (48 tons), —.

Gunmetal.—BS1400, LG2 (85/5/5/5), £175; LG3 (86/7/5/2), £185; G1 (88/10/2/½), £243; (88/10/2/1), £234.

Phosphor Bronze.—BS1400, PB1 (AID released), £258 per ton.

Leaded Phosphor Bronze.—BS1400, LPB1 (1060), £193 per ton.

Phosphor Bronze Strip, etc.—Strip, 269s. 0d. per cwt.; wire, 3s. 10½d. per lb.; rods, 3s. 1¼d.; tubes, 3s. 1⅞d.; chill cast bars: solids 3s. 1¼d.; cored 3s. 2¼d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 3s. 7¾d. per lb.; round wire, 10g. in coils (10 per cent.), 4s. 0½d.; special quality turning rod, 10 per cent., ½ in. dia., in straight lengths, 3s. 1½d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 5½d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £79 0s. 0d. Nickel, £600 0s. 0d. Aluminium ingots, £180 0s. 0d.; aluminium bronze (BS1400), AB1, £207; AB2, £223.

Forthcoming Events

OCTOBER 13

Institution of Production Engineers

Stoke-on-Trent section: "Patternmaking in Plastics," by H. G. King, 7.30 p.m., at the Grand Hotel, Hanley.

OCTOBER 14

Incorporated Plant Engineers

Manchester branch: "Industrial Electronics," by Commander V. J. Copley-May, 7.15 p.m., at the Engineers' Club, Albert Square.

Institute of British Foundrymen

Coventry and district branch: Presidental address, followed by "Recent Improvements of Investment-casting Techniques," by D. F. B. Tedds, 7.30 p.m. in Room A.5 at the Coventry Technical College.

Chemical Engineering Group

London branch: "Titanium and its Alloys as Materials of Construction for Chemical Plant," by Dr. K. W. J. Bowen, 6 p.m., at the Society of Chemical Industry, 14, Belgrave Square, S.W.1.

OCTOBER 15

Institute of Vitreous Enamellers

Southern section: Annual general meeting, followed by "Developments in Steel Shot and its Applications to Vitreous Enamelling," by D. W. S. Hurst; 7.15 p.m., at the Howard Hotel, Norfolk Street, London, W.C.2.

Incorporated Plant Engineers

Kent branch: "Ultrasonics in Industry," by C. B. Abel-Harry, 7 p.m., at the Kings Head Hotel, High Street, Rochester.

Institution of Production Engineers

Western section: "Productivity in the European Common Market," by Lt.-Gen. Sir Thomas Hutton, 7.30 p.m., in the large Lecture Theatre, University of Bristol.

Institute of British Foundrymen

Southampton section: "Die-casting," by H. J. Sharp, PH.D., M.SC., 7.30 p.m., at the Technical College, St. Mary's Street.

OCTOBER 16

Institute of British Foundrymen

Northampton and district section: "Moulding with the CO. Process in a Jobbing Foundry," by J. Hird, 7.30 p.m., at the Coffee Room, Plough Hotel, Northampton.

Southampton Metallurgical Society

"Metallurgy in the Foundry," by Dr. O. P. Einerl, F.I.M., 7.15 p.m., in the lecture room of the Educational Department, Southampton University.

Contracts Open

The dates given are the latest on which tenders will be accepted. The addresses are those from which forms of tender may be obtained. Details of tenders with the reference ESB can be obtained from the Board of Trade Export Services Branch, Lacon House, Theobalds Road, London, W.C.1 (telephone: CHAncery 4411, ext. 738 or 771), unless otherwise stated.

AUSTRALIA—B.T.M. Agencies (Pty.), Limited, Churchill Road, Kilburn, Adelaide, South Australia, would like to represent United Kingdom manufacturers of industrial engines other than two-stroke, components for diesel and diesel-electric locomotives, and parts or equipment used in nuclear reactors. (ESB/23448/58.)

SWEDEN—Mellander & Ericsson AB, Ostra Hamngatan 52, Gothenburg, wish to represent in Sweden a United Kingdom maker of electric fork-lift trucks in the 2,000 lb. range. (ESB/22220/58.)

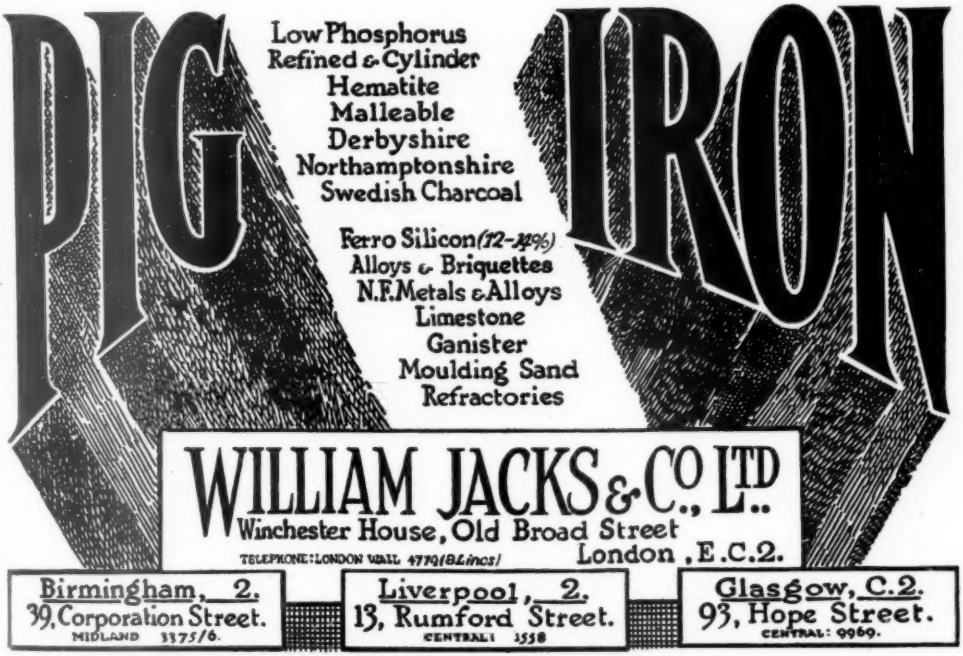
INDONESIA, October 15—Hand- and machine-tools, pumps, metal-working machinery, agricultural equipment, and surveying equipment. (ESB/24122/58/ICA.)

SOUTH AFRICA, October 16—Conveyor equipment. (ESB/24030/58.)

THAILAND, October 20—Agricultural machinery. (ESB/23875/58/ICA.)

USA, October 16—Motor-driven pumping units. (ESB/24219/58.)

SOUTH AFRICA, October 16—Guillotine shearing machine. (ESB/24259/58.)



New Catalogues

Blast Cleaning and Dust Collection. Hepburn Conveyor Company, Limited, Wakefield, having acquired a manufacturing licence from the Pangborn Corporation of Hagerstown, Maryland, USA, have now issued an eight-page brochure describing and illustrating a range of shotblast plant covering air-blast barrels, Rotoblast—both batch and continuous—types of barrels, and four different types of rotating-table machines, one of which is an enclosed room. A number of plant applications are described. Finally, there are annotated pictures of the Ventrijet, which is a dust-collector operating on a venturi system. The centre of the brochure carries a general article on blast cleaning in industry.

Patternshop Requisites. Catalogue No. 58, received from John Burn & Company (Birmingham), Limited, Henshaw Road, Small Heath, Birmingham, 10, is spirally bound and runs to 40 pages. It opens with a description of all sorts and sizes of pattern letters, figures, and the like. Then a variety of punches, stencils, inks and brushes are covered, and this section is followed by one dealing with dowel-plates in great variety, plugs and dowels, and lifting straps. Then fillets, coreboxes, corebox clips and vents, varnishes, enamels and glues combine to form as complete a range of patternshop supplies as was ever assembled in one catalogue.

Oil Valves and Burners.—Stordy Engineering, Limited, Cumbria House, Goldthorn Hill, Wolverhampton, has issued three catalogues numbered 90, 100, and 110, the first of which deals with the Hauck proportioning oil-burner; the second, a self-cleaning and metering type of oil-valve, and the third, a micro-cam oil-valve. Firms using oil-burning equipment will find these leaflets of interest. The Stordy concern manufactures these valves and burners under licence from the Hauck Manufacturing Company of New York.

Dust Filters.—Folder No. 58 received from Dallow Lambert & Company, Limited, Thurmaston, Leicester, serves as a reminder that the foundry industry is not unique in having dust-reduction problems. Certainly the leaflet carries several pictures of foundry installations, but other illustrations show equipment made by the company serving the plastics, rubber and woodworking industries. The filters are said to be well suited for cases where the dust carries no valuable material in its make-up.

Swarf- and Scrap-handling Conveyors. A very useful brochure has been received from the New Conveyor Company, Limited, Brook Street, Smethwick, Birmingham 40, which covers the handling of swarf from its point of production at the actual machine, through conveyor systems and transfer points, to the crushing and oil-recovery sections and through to the balers. Moreover, general methods used in handling the baled product are described and illustrated. A detailed layout is given of an oil-reclamation system.

Industrial Protective Clothing. The protective clothing division of Scaffolding (Great Britain), Limited, Mitcham, Surrey, have issued a 12-page booklet covering overalls, coats, gloves and boots. To ensure delivery from stock, no fewer than 36 branches have been established in all the main cities and towns of the country.

Company News

INDIAN IRON & STEEL COMPANY, LIMITED—The company is to apply to the Indian Government for consent for a scrip issue on a one-for-five basis.

POWER SECURITIES CORPORATION, LIMITED—A rights issue of 250,000 £1 ordinary shares at 37s. per share is to be made. The rights will belong on a one-for-seven basis to holders on September 25.

RADIATION, LIMITED—The directors are to defer consideration of a payment on the ordinary until the results for 1958 are available. A single dividend of 5 per cent. was paid for 1957. In May, the directors foreshadowed a dividend of not less than 5 per cent. on the capital as increased by shares issued against the acquisition of Parnall (Yate), Limited.

DAVY & UNITED ENGINEERING COMPANY, LIMITED—Following the recent rights issue, only 4,701 excess shares remained to meet 776 applications for a total of 203,100 shares. Consequently, allotment has been drastically scaled down. After allotment to applicants for up to five excess shares, applicants for six to 200 shares get five shares and from 210 to 1,200 shares, 10 shares. A maximum of 22 shares was allotted to applicants for over 1,200 excess shares.

COCHRAN & COMPANY, ANNAN, LIMITED, boilermakers, engineers, etc., of Annan—A 7 per cent. tax free distribution could be made, but having regard to profits tax, the directors recommend a final of 5 per cent., tax free, making 8 per cent. for the year to June 30, 1958, on capital increased by a one-for-four scrip issue and a special interim of 2 per cent., tax free, on account of 1958-59. After tax of £156,615 (£143,942), the net profit is £116,623. The wholly-owned subsidiary went into voluntary liquidation on July 1, 1957.

A.P.V. COMPANY, LIMITED, dairy, brewery, chemical and general engineers, of Crawley (Sussex)—The chairman, Mr. W. E. Jenkins, says that trading results for the half year ended June 30, 1958, of the parent company and the home subsidiary are, subject to audit, better than for the same period in the previous year, but prospects for the current six months are less favourable owing to a smaller volume of orders and reduced profit margins. Interim reports from overseas subsidiaries, with the exception of Canada and the United States, are regarded as satisfactory under prevailing trading conditions. The situation in Canada, however, continues to be unsatisfactory and the company is faced with further losses from this subsidiary. No interim dividend is declared on the ordinary. Dividends on the preference for the six months ending October 31 will be paid on November 1. No dividends were paid on the ordinary for either 1957 or 1958.

AT A MEETING of the Greater Birmingham Employment Committee in Birmingham on September 25, the chairman of the committee, Prof. P. Sargant Florence, said that while the American motor-car industry especially in Detroit, had been sharply hit by the American recession, there was a boom in the British counterpart. Nevertheless, in view of the fact that America was overcoming its recession, he was none too optimistic about the future of the industry in the UK, though he saw no reason for any serious worsening of the position here. Mr. A. C. Cox, secretary of the committee, said figures for September 14 showed that there were 7,456 men unemployed in the area against 6,740 in July.